Education Department Bulletin

Published fortnightly by the University of the State of New York

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No. 495 ALBANY, N. Y. May 15, 1911

New York State Museum

John M. Clarke, Director

Charles H. Peck, State Botanist

Museum Bulletin 150

REPORT OF THE STATE BOTANIST 1910

ALBANY

UNIVERSITY OF THE STATE OF NEW YORK

1911

Mb113r-F11-2000

STATE OF NEW YORK

EDUCATION DEPARTMENT

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With years when terms expire

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New York State Education Department
Science Division, January 25, 1911

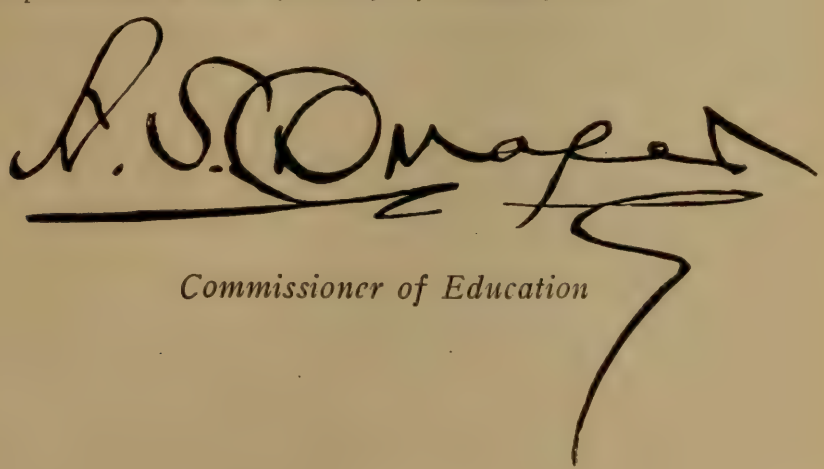
Hon. Andrew S. Draper LL.D.
Commissioner of Education

SIR: I have the honor to transmit herewith the report of the State Botanist for the fiscal year ending September 30th, 1910, and to recommend the same for publication as a bulletin of the State Museum.

Very respectfully
JOHN M. CLARKE
Director

STATE OF NEW YORK
EDUCATION DEPARTMENT
COMMISSIONER'S ROOM

Approved for publication this 27th day of January 1911



Commissioner of Education

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No. 495 ALBANY, N. Y. MAY 15, 1911

New York State Museum

JOHN M. CLARKE, Director

CHARLES H. PECK, State Botanist

Museum Bulletin 150

REPORT OF THE STATE BOTANIST 1910

Dr John M. Clarke, Director of State Museum:

I have the honor to submit the following report of work done in the botanical section of the State Museum:

Since the date of my last report specimens of plants for the State herbarium have been collected in the counties of Albany, Chemung, Columbia, Essex, Greene, Livingston, Rensselaer, Saratoga, St Lawrence, Steuben, Ulster and Warren. There have been contributed specimens of plants that were collected in the counties of Albany, Cayuga, Cortland, Delaware, Essex, Franklin, Fulton, Greene, Genesee, Hamilton, Herkimer, Monroe, Nassau, Oneida, Onondaga, Ontario, Orleans, Oswego, Saratoga, Schoharie, St Lawrence, Suffolk, Tompkins, Warren, Washington, Wayne and Wyoming.

There have been received specimens of extralimital species of plants that were collected in Alabama, Colorado, Connecticut, District of Columbia, Florida, Indiana, Kansas, Kentucky, Maine, Massachusetts, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Brunswick, New Jersey, New Mexico, North Carolina, Nova Scotia, Ohio, Ontario, Pennsylvania, Texas, Utah, Washington and Wisconsin.

The number of species of which specimens have been added to the herbarium is 270. This includes contributed and collected specimens. Of this number, 79 species are new to the herbarium and 23 species are believed to be new to science. The new species are all fungi. A list of the added species is marked "Plants added to the herbarium."

The number of those who have contributed specimens is 176. This includes those who sent specimens merely for identification

if the specimens were collected in our State and were desirable additions to the herbarium. The number of identifications made of specimens sent or brought to the office by inquirers is 2419. The number of persons for whom identifications were made and the number of identifications made exceed the corresponding numbers, 152 and 1717, for last year. This indicates a gratifying increase in the general desire for botanical information. A list of the names of the contributors and their respective contributions is marked "Contributors and their contributions."

Names and notices of species new to our New York flora and descriptions of new species are given in a chapter marked "Species not before reported."

New localities of rare plants, descriptions of new varieties and any facts of interest that may have been observed are given in a chapter entitled "Remarks and observations."

Species of fungi collected outside our State limits are frequently sent for identification. Sometimes specimens are received that do not correspond to any published description. In such cases the fungus is given a name and a description of it prepared. These names and descriptions make a chapter with the heading "New species and varieties of extralimital fungi."

Specimens of five species of Crataegus, or thorn bushes, have been added to the large number already represented in the herbarium. Four of these have not before been reported and are new to our flora.

Specimens of five species of mushrooms have been collected and their edible qualities tried and approved. These make the whole number of our New York edible species and varieties 205. Three plates have been prepared on which the five added species are represented by colored figures, natural size. Descriptions of these species may be found in a chapter on "Edible fungi." Two other plates have been prepared on which three new species of mushrooms are represented.

One species has been tried which, when eaten freely, causes a profuse perspiration but no other inconvenience. Its flavor, texture and digestibility are faultless, but its effects are such as to place it among medicinal, not edible, mushrooms. My attention was first called to this peculiar character of the mushroom by Mr F. G. Howland and through his kindness in furnishing me samples of it I have been able to verify its sudorific properties. Perhaps experimentation may prove it to be useful in cases of illness where a sudorfic medicine is desirable. An account of my experiment

may be found under the name Clitocybe dealbata sudorifica, in the chapter entitled "Remarks and observations."

Having been informed that the raspberry patches of the fruit growers in the vicinity of Marlboro, Ulster county, were suffering from disease and wishing to know the cause of it, a visit was made to that place in July. An examination of the diseased canes showed that they were suffering from an attack of a parasitic fungus whose botanical name is Sphaerella rubina Pk. The fruiting canes develop their leaves and flowers as usual but before the fruit ripens it withers and dries on the branches. The dryness of the season and an attack of "red spider" on the foliage were apparently contributing causes of the failure of the crop and the loss was severe. The diseased canes bore patches of the fungus. It matures its spores early in the season. In the type specimens they were found in May. The young canes showed brown or blackish patches one or two inches long on the lower part. In some cases they were near the ground, thereby indicating a probable infection while they were but a few inches tall. These spots had not yet developed their perithecia or spore cases but doubtless would toward the end of the season and next spring be ready to shed their spores and renew the species in the succeeding crop of young canes. Theoretically the disease should be prevented by spraying the young canes with a good fungicide like Bordeaux mixture or lime sulfur mixture, but it would be necessary to give the first spraying when the young shoots are only three or four inches high. This should be repeated once a week till the canes of the previous year begin to blossom.

While there, my attention was called to a diseased chestnut tree. It was a young tree with sickly looking foliage and a few dead branches. It was suffering from the chestnut bark disease caused by a parasitic bark fungus. Both branches and trunk were affected by the fungus, the latter but a few feet above the ground. It was my first opportunity to see a tree affected by this disease about which much that appears to me to be overdrawn and needlessly alarming has recently been published in magazines and newspapers. Remarks concerning its distribution in our State are given under the name Valsonectria parasitica (Murr.) Rehm in the chapter headed "Remarks and observations."

In 1899 a census of the flowering plants and ferns of Bonaparte swamp was taken and a list of the species was published in the report of the Botanist for that year. The swamp is a large one

lying in the northern part of Lewis county a short distance east of Lake Bonaparte. It is about two miles in diameter where the Carthage and Adirondack Railroad crosses it. The number of species of flowering plants and ferns found in it is 128.

The swamps and peat marshes of the State are a part of our natural resources. When cleared, drained, and properly cultivated they constitute some of our most valuable agricultural lands. Their gradual formation from a water surface to a land surface is interesting and due chiefly to the agency of plants. If the original pond or lake is very shallow its whole surface, except the central channel through which the stream flows, is occupied by aquatic plants. These by their annual growth and partial decay form a sedimentary deposit which gradually fills the lake until water-loving mosses, sphagnum, and other marsh plants take possession. When this has taken place we have a sphagnum marsh. If the lake is deep in the center the marsh forms only along the shallow margins. By the yearly growth and decay of the plants of the sphagnum marsh its surface gradually becomes firmer and small shrubs and herbs of wet places take possession. When the shrubs predominate it is called a shrubby marsh; when marsh grasses and sedges are the prevailing vegetation it is a grassy marsh. In due time the surface of the shrubby marsh becomes sufficiently firm to sustain and support certain kinds of trees whose roots do not object to an abundant and constant supply of moisture. When this stage has been reached we have a swamp, a low wet piece of woods covered with trees and tall shrubs. The border of a marsh may be and often is a wooded swamp which is itself merely an older part of the marsh. The grassy marsh appears to be less inviting to the advent of trees than the sphagnum marsh, and prairielike, it often remains open an indefinite time. Among the natural products of our marshes are the two species of cranberries, the large or common cranberry and the small cranberry, the mosses used by florists and nurserymen for packing material and the peat used as an absorbent or bedding in stables and ultimately in this way as a component of the stable manure. The more firm and fibrous peat from bushy marshes is used for various purposes requiring a fibrous material and for heating purposes. The grasses and sedges of the grassy marsh are sometimes cut for hay, but this is rarely done except in cases of scarcity or very high prices of hay of better quality. The sedges of certain species are sometimes utilized in making "crex carpets" and various articles of furniture.

That we may have a more definite knowledge of the species of plants that are most prevalent in our marshes, and consequently the most common agents in transforming our marshes into a more useful condition, a list of the flowering plants and ferns of two of our marshes has been made. This list, with a description of the marshes, will be found in a chapter entitled "Cranberry and Averyville marshes."

In accordance with the plan previously adopted, a revision of our species of Hypholoma and Psathyra has been made. The descriptions have been rewritten and the species arranged in the groups or sections in which they were distributed by Fries, and the usual "keys" prepared. The chapters containing these descriptions are respectively entitled "New York species of Hypholoma" and "New York species of Psathyra."

The coincidence between a plentiful crop of wild mushrooms and good crops of staple agricultural products has been noticed in previous reports. The past season has furnished a noticeable confirmation of the results of previous observations. While the usual summer drouth in the eastern and southeastern parts of the State was quite severe and wild mushrooms correspondingly scarce, in other parts of the State the rainfall has been more abundant and the crop of wild mushrooms has been plentiful. One correspondent writing from Silver Springs, Wyoming county, in speaking of one of his collecting excursions, says, "I am swamped with the number and variety of mushrooms now growing in the woods. It seems that I find a new kind at almost every step. I had a market basket full of specimens which comprised about fifty species." Another correspondent writing from Fourth lake, Herkimer county, says, "Mushroom hunting has been very delightful here this season. I have found so many fine specimens I could not keep pace with them."

The season has been specially favorable to the development of the giant puffball, Calvatia gigantea (Batsch). They have appeared in unusual numbers and, in some cases, of unusual size. A correspondent writing from Pittsford, Monroe county, says, "I am sending you a specimen of Calvatia gigantea weighing seven pounds. They are very plentiful here this season. I have seen thirty-five or more, one weighing twelve pounds." A single one of medium size, that is, eight to ten inches in diameter, is sufficient to afford a meal to a family of ordinary size. The same correspondent says "Puffballs are growing here by the hundred and we are enjoying them very much. Mushrooms in

this part of the country are very plentiful." The giant puffball usually grows in open places and but one or two in a place, but in New Lebanon, Columbia county, there is a station shaded by young deciduous trees where I saw about a dozen specimens growing in close proximity to each other.

Mr S. H. Burnham, my assistant, has continued the clerical work of the office, doing all the typewriting of labels, letters and reports, attending to the correspondence of the office during my absence on collecting trips, preparing, disinfecting, labeling and arranging the specimens in their proper places, and aiding in the identification of specimens. He has also aided in the investigation of the pine rust that has been proving injurious to young plantations of white pine.

Respectfully submitted

CHARLES H. PECK

State Botanist

Albany, December 28, 1910

PLANTS ADDED TO THE HERBARIUM

New to the herbarium

Amanita bisporigera *Atk.*
A. floccocephala *Atk.*
A. velatipes *Atk.*
Ascochyta menyanthis *Oud.*
Aulographum ledi *Pk.*
Biatora coarctata (*Sm.*) *Nyl.*
Calvatia craniiformis (*Schw.*)
Camelina sativa (*L.*) *Crantz*
Cercospora phlogina *Pk.*
Cladosporium paeoniae *Pass.*
Climacium kindbergii (*R. & C.*)
Clitocybe biformis *Pk.*
C. maxima *G. & M.*
Cortinarius croceofolius *Pk.*
C. glaucopus (*Schaeff.*)
C. napus *Fr.*
C. triumphans *Fr.*
Crataegus aristata *S.*
C. brainerdi *S.*
C. calvini *S.*
C. longipedunculata *S.*
C. nemorosa *S.*
Crepis setosa *Hall. f.*
Cryptosporium macrospermum *Pk.*
Cycloloma atriplicifolium (*Spreng.*)
Cytospora microspora (*Cd.*) *Rabenh.*
Diplodia linderae *E. & E.*
Eccilia mordax *Atk.*
Eurotium subgriseum *Pk.*
Gloeosporium caryae *E. & D.*
G. divergens *Pk.*
Grindelia squarrosa (*Pursh*) *Dunal*
Helianthus petiolaris *Nutt.*
Heterothecium pezizoideum (*Ach.*)
Hygrophorus caprinus (*Scop.*) *Fr.*
Hypericum prolificum *L.*
Hypholoma delineatum *Pk.*
Hypochnus tristis *Karst.*
Inocybe rimosoides *Pk.*
Lactarius boughtoni *Pk.*
Lentinus piceinus *Pk.*
Lychnis coronaria (*L.*) *Desr.*
Machaeranthera pulverulenta (*Nutt.*)
Macrosporium heteronemum (*Desm.*)
Marasmius contrarius *Pk.*
Myxosporium carpini *Pk.*
Naemospora croceola *Sacc.*
Naucoria sororia *Pk.*
Oidium asteris-punicei *Pk.*
Oxybaphus floribundus *Chois.*
Pertusaria leioplaca (*Ach.*)
Pholiota terrigena *Fr.*
Phoma piceina *Pk.*
P. simillima *Pk.*
P. stictica *B. & Br.*
Phyllosticta betae *Oud.*
P. subtilis *Pk.*
Physcia hispida (*Schreb.*)
Picris hieracioides *L.*
Pilocratera abnormis *Pk.*
Placodium ferrug. discolor *Willey*
Plasmodiophora elaeagni *Schroet.*
Pleurotus approximans *Pk.*
Ramalina rigida (*Pers.*) *Tuck.*
Rhabdospora physostegiae *Pk.*
Scirpus occidentalis (*Wats.*) *Chase*
Sideranthus gracilis (*Nutt.*) *Rydb.*
Sphaeropsis smilacis latispora *Pk.*
Sporotrichum grisellum *Sacc.*
Theloschistes flavicans *Wallr.*
Thlaspi perfoliatum *L.*
Trichothecium subgriseum *Pk.*
Triosteum perfoliatum *L.*
Usnea trichodea *Ach.*
Vermicularia beneficiens *Pk.*
V. pomicola *Pk.*
Verticillium agaricinum (*Lk.*) *Cd.*
Viburnum venosum *Britton*
Vicia villosa *Roth*

Not new to the herbarium

Acalypha virginica *L.*
Agaricus abruptibulbus *Pk.*
A. arvensis *Schaeff.*
Alisma plantago-aquatica *L.*
Ambrosia artemisiifolia *L.*
Amelanchier oblongifolia (*T. & G.*)
Antennaria neglecta *Greene*
Apocynum cannabinum *L.*

Arabis laevigata (*Muhl.*) *Poir*
Arceuthobium pusillum *Pk.*
Aristolochia clematitis *L.*
Artemisia biennis *Willd.*
Asclepias syriaca *L.*
Aspidium thelypteris (*L.*) *Sw.*
Aster laevis *L.*
A. schreberi *Nees*
A. undulatus *L.*
Astragalus neglecta (*T. & G.*) *Sheld.*
Barbarea stricta *Andrz.*
Boletinus paluster *Pk.*
Boletus clintonianus *Pk.*
B. elbensis *Pk.*
B. parasiticus *Bull.*
Brassica arvensis (*L.*) *Ktze.*
Broussonetia papyrifera (*L.*)
Calvatia gigantea (*Batsch*)
Calyptospora goeppertiana *Kuehn*
Camelina microcarpa *Andrz.*
Cantharellus infundibuliformis (*Scop.*)
Cardamine parviflora *L.*
Carex canescens *L.*
C. longirostris *Torr.*
Centaurium umbellatum *Gilib.*
Cerastium viscosum *L.*
Ceratiomyxa fruticulosa (*Muell.*)
Cladosporium carpophilum *Thuem.*
Cinna arundinacea *L.*
C. latifolia (*Trev.*) *Griseb.*
Collybia butyracea (*Bull.*) *Fr.*
Cornus canadensis *L.*
Coronilla varia *L.*
Cortinarius sanguineus *Fr.*
Crataegus apposita *S.*
C. colorata *S.*
C. dissociabilis *S.*
C. dissona *S.*
C. foetida *Ashe*
C. grayana *Eggle.*
C. inopinata *S.*
C. inusitula *S.*
C. leiophylla *S.*
C. pellecta *S.*
C. punctata *Jacq.*
C. recta *S.*
C. spatifolia *S.*
C. succulenta *Lk.*
C. tenuiloba *S.*
Cryptotaenia canadensis (*L.*)
Cynoglossum officinale *L.*
Cynosurus cristatus *L.*
Cyperus grayi *Torr.*
Daphne mezereum L.
Daucus carota *L.*
Desmodium canescens (*L.*) *DC.*
Epilobium hirsutum *L.*
Erechtites hieracifolia (*L.*) *Raf.*
Eriophorum callitrix *Cham.*
E. virginicum *L.*
Erysiphe polygoni *DC.*
Eupatorium hyssopifolium *L.*
E. purpureum *L.*
Euphorbia corollata *L.*
E. peplus *L.*
Fusicladium dendriticum (*Wallr.*)
Galium aparine *L.*
G. palustre *L.*
Gentiana quinquefolia *L.*
Gerardia maritima *Raf.*
G. purpurea *L.*
G. virginica (*L.*) *BSP.*
Gnaphalium uliginosum *L.*
Habenaria dilatata (*Pursh*) *Gray*
Hedeoma hispida *Pursh*
Helvella crispa (*Scop.*) *Fr.*
H. gracilis *Pk.*
Herpotrichia diffusa (*Fckl.*)
Hieracium canadense *Mx.*
H. murorum *L.*
Hordeum jubatum *L.*
H. trifurcatum *Jacq.*
Hydrastis canadensis *L.*
Hygrophorus eburneus (*Bull.*) *Fr.*
Hypholoma appendiculatum (*Bull.*)
Hex verticillata (*L.*) *Gray*
Ilex verticillata (*L.*) *Gray*
Juncus bufonius *L.*
Kalmia polifolia *Wang.*
Lechea racemulosa *Mx.*
Lenzites sepiaria *Fr.*
Leontodon nudicaulis (*L.*) *Banks*
Lepidium campestre (*L.*) *R. Br.*
L. draba *L.*
Lepiota procera (*Scop.*) *Fr.*
L. rubrotincta *Pk.*
Liatris scariosa *Willd.*
Lithospermum arvense *L.*
L. officinale *L.*
Lotus corniculatus *L.*
Luzula spicata (*L.*) *DC.*

Lycoperdon atropurpureum *Vitt.*
Massariella scoriadea (*Fr.*) *Sacc.*
Melissa officinalis *L.*
Mitrula cucullata *Fr.*
Monarda fistulosa *L.*
Monilia crataegi *Diedicke*
Mycogone cerv. subincarnata *Pk.*
Myrica asplenifolia *L.*
Oidium destruens *Pk.*
Onosmodium hispidissimum *Mack.*
Osmorhiza slaytoni (*Mx.*) *Clarke*
Osmunda cinnamomea *L.*
Panax quinquefolium *L.*
Panicum agrostoides *Spreng.*
P. amarum *Ell.*
P. boreale *Nash*
P. scribnerianum *Nash*
P. spretum *Schultes*
Paspalum circulare *Nash*
P. muhlenbergii *Nash*
P. setaceum *Mx.*
Phyllosticta podophylli (*Curt.*)
Picea mariana (*Mill.*) *BSP.*
Plantago elongata *Pursh*
P. media *L.*
Polygonum prolificum (*Small*)
Polypodium vulgare *L.*
Polyporus circinatus *Fr.*
P. frondosus *Fr.*
P. pubescens (*Schum.*) *Fr.*
Potamogeton americanus *C. & S.*
Prunus cuneata *Raf.*
P. pennsylvanicus *L. f.*
Puccinia rubigo-vera (*DC.*) *Wint.*
Ribes prostratum *L'Her.*
Roestelia aurantiaca *Pk.*
Rudbeckia laciniata *L.*
Rumex hastatulus *Baldw.*
Russula brevipes *Pk.*
Sabatia stellaris *Pursh*
Sagina decumbens (*Ell.*) *T. & G.*
Salix petiolaris *Sm.*
S. purpurea *L.*
S. rostrata *Richards.*
S. tristis *Ait.*
Scirpus olneyi *Gray*
Sedum purpureum *Tausch*
Septoria violae *West.*
Serapias helleborine *L.*
Setaria verticillata (*L.*) *Bv.*
Solidago neglecta *T. & G.*
Sparganium minimum *Fr.*
Spartina patens juncea (*Mx.*)
Spergularia marina (*L.*)
Sphaeronema acerinum *Pk.*
Sphaerotheca humuli (*DC.*)
Sphenopholis pallens (*Spreng.*)
Spirea latifolia *Borkh.*
Sporobolus cryptandrus (*Torr.*)
Steironema ciliatum (*L.*) *Raf.*
Stipa avenacea *L.*
Teucrium canadense *L.*
T. occidentale *Gray*
Thaspium barbinode (*Mx.*) *Nutt.*
Thymus serpyllum *L.*
Tilia michauxii *Nutt.*
Tricholoma vaccinum (*Pers.*) *Fr.*
Trichostemma dichotomum *L.*
Tridens flavus (*L.*) *Hitchc.*
Urtica lyalli *Wats.*
Ustilago longissima (*Sow.*)
U. zeae (*Beckm.*) *Ung.*
Vaccinium atrococcum (*Gray*)
V. macrocarpon *Ait.*
V. oxycoccos *L.*
Valsonectria parasitica (*Murr.*)
Veronica anagallis-aquatica *L.*
Viburnum dentatum *L.*
V. pauciflorum *Raf.*
Vicia americana *Muhl.*
V. angustifolia (*L.*) *Reich.*
Viola Blanda *Willd.*
Viola pallens *(Banks) Brain.*

CONTRIBUTORS AND THEIR CONTRIBUTIONS

Miss L. C. Allen, Newtonville, Mass.

Lentinus spretus *Pk.*
Lepiota allenae *Pk.*

Miss H. C. Anderson, Lambertville, N. J.

Boletus albus *Pk.*
Psathyrella graciloides *Pk.*

Miss F. Beckwith, Rochester

Aster laevis *L.*
Helianthus petiolaris *Nutt.*
Leontodon nudicaulis (*L.*) *Banks*
Lotus corniculatus *L.*
Machaeranthera pulverulenta (*Nutt.*)
Sideranthus gracilis (*Nutt.*) *Rydb.*

Mrs E. B. Blackford, Boston, Mass.

Clavaria pulchra *Pk.*
Flammula graveolens *Pk.*
Hebeloma mesophaeum *Fr.*
Naucoria myosotis *Fr.*

Miss E. S. Blunt, Elizabethtown

Ambrosia artemisiifolia *L.*

Miss G. S. Burlingham, New York

Lactarius glyciosmus *Fr.*

Miss M. C. Burns, Middleville

Lepiota procera (Scop.) *Fr.*

Mrs C. F. Davis, Portland, Me.

Peziza aurantia *Pers.*

Mrs E. P. Gardner, Canandaigua

Astragalus neglectus (*T. & G.*)
Cryptataenia canadensis (*L.*) *DC.*
Lychnis coronaria (*L.*) *Desr.*
Melissa officinalis *L.*
Monarda fistulosa *L.*
Steironema ciliatum (*L.*) *Raf.*
Teucrium occidentale *Gray*

Mrs L. L. Goodrich, Syracuse

Centaureum umbellatum *Gilib.*
Daphne mezereum *L.*
Lepidium draba *L.*

Miss A. Hibbard, West Roxbury, Mass.

Entoloma cyaneum *Pk.*
Lactarius colorascens *Pk.*
Naucoria myosotis *Fr.*
Pholiota duroides *Pk.*
Russula bresadolae *Schulz*

Mrs S. Manning, St Paul, Minn.

Flammula flavida *Pers.*

Miss E. W. Mische, Syracuse

Daphne mezereum *L.*

Mrs C. E. Putnam, St Paul, Minn.

Flammula flavida *Pers.*

Mrs S. W. Russell, Glens Falls

Polypodium vulgare *L.*

Mrs F. C. Sherman, Syracuse

Clitocybe maxima *G. & M.*
Stropharia depilata *Pers.*

Miss A. Van Horne, Montreal, Can.

Cantharellus brevipes *Pk.*

Miss E. C. Webster, Canandaigua

Crataegus calvini *S.*
C. gemmosa *S.*
C. longipedunculata *S.*
Cynosurus cristatus *L.*
Hieracium murorum *L.*
Plantago media *L.*
Puccinia rubigo-vera (*DC.*) *Wint.*
Scirpus occidentalis (*Wats.*)
Scrapias helleborine *L.*
Setaria verticillata (*L.*) *Bv.*
Vicia americana *Muhl.*

Miss H. Whalen, Ballston Spa

Agaricus campester hortensis *Cke.*

Mrs M. E. Whetstone, Minneapolis, Minn.

Flammula pulchrifolia *Pk.*
Lentinus tigrinus (*Bull*) *Fr.*
Lepiota rubrotincta *Pk.*
Mycogone cerv. subincarnata *Pk.*
Psathyrella caudata *Fr.*
Tubaria inquilina *Fr.*
Volvaria peckii *Atk.*
V. speciosa *Fr.*

F. H. Ames, Brooklyn

Amanita radicata *Pk.*
Boletus vermiculosus *Pk.*
Lactarius torminosus *Fr.*
Usnea trichodea *Ach.*

G. F. Atkinson, Ithaca

Amanita bisporigera *Atk.*
A. floccocephala *Atk.*
A. velatipes *Atk.*
Bubakia crotonis (*Cke.*) *Arth.*
Collybia familia *Pk.*
Craterellus cornucopioides (*L.*)
Eccilia mordax *Atk.*
Eocronartium typhuloides *Atk.*
Hygrophorus caprinus (*Scop.*) *Fr.*
H. chrysodon (*Batsch*)
H. luridus *B. & C.*
Hypholoma boughtoni *Pk.*
Kuehneola albida (*Kuehn*) *Magn.*
Lactarius camphoratus (*Bull.*)
Naucoria sororia *Pk.*
Panaeolus papilionaceus *Fr.*
Pholiota terrigena *Fr.*
Plasmopara halstedii (*Farl.*)
Polyporus caeruleoporus *Pk.*
Russula crustosa *Pk.*
Sporotrichum grisellum *Sacc.*
Uromyces appendiculatus (*Pers.*)

G. G. Atwood, Albany

Cryptosporium macrospermum *Pk.*
Roestelia aurantiaca *Pk.*
Sphaerotheca humuli (*DC.*) *Burr.*

H. J. Banker, Greencastle, Ind.

Hydnum combinans *Pk.*
H. farinaceum *Pers.*
Hydum populinum *Pk.*
Irpex ambiguus *Pk.*

E. Bartholomew, Stockton, Kan.

Basidiophora kellermanii (*E. & H.*)
B. kell. paupercula *Pk.*
Bertia querceti *Rehm*
Bispora effusa *Pk.*
Cercospora clavata (*Ger.*) *Pk.*
C. verbenae-strictae *Pk.*
Coniosporium arundinis (*Cd.*) *Sacc.*
C. perplexum *Pk.*
Crucibulum vulgare *Tul.*
Cyathus striatus schweinitzii *Tul.*
Cylindrosporium conservans *Pk.*
C. padi cerasina *Pk.*
Daedalea unicolor (*Bull.*) *Fr.*
Dasyscypha bicolor (*Bull.*) *Fckl.*
Diaporthe alnea *Fckl.*
D. callicarpae *Pk.*
Diatrype bullata (*Hoffm.*) *Fr.*
Diplodia alni-rubrae *Pk.*
Eutypella ailanthi *Sacc.*
E. stellulata (*Fr.*) *Sacc.*
Helminthosoporium macrocarpum *Grev.*
H. subapiculatum *Pk.*
Hormiscium ambrosiae *Pk.*
Hymenochaete rubiginosa (*Schrad.*)
H. tabacina (*Sow.*) *Lev.*
Hypochnus sambuci (*Pers.*) *Fr.*
Hypoxylon bartholomaei *Pk.*
Hypoxylon fuscum (*Pers.*) *Fr.*
Leptosphaeria sambuci *Fautr.*
Leptothyrium punctiforme *B. & C.*
Macrosporium sarcinula *Berk.*
Melanconis anomala *Pk.*
Melanconium bicolor candidum *Pk.*
Melanomma pulvis-pyrius (*Pers.*)
Merulius corium *Fr.*
Microdiplodia viciae *Pk.*
Microsphaera alni (*Wallr.*) *Salm.*
Ovularia rigidula *De ac.*
O. stachydis-ciliatae *Pk.*
Phleospora mori (*Lev.*) *Sacc.*
Phyllosticta paupercula *Pk.*
Polystictus abietinus *Fr.*
Ramularia virgaurea *Thuem.*
Septoria aceris-macrophylli *Pk.*
S. ficarioides *Pk.*
S. samarae *Pk.*
Sphaerella gaultheriae *C. & P.*
S. rumicis (*Desm.*) *Cke.*
Sphaeromyces delphinii *Pk.*
Sphaeropsis melanconioides *Pk.*
Trimmatostroma americana *Thuem.*
Uredo quercus *Broud.*
Valsa minutella *Pk.*
V. salicina tetraspora (*Curr.*) Valsella salicis *Fckl.*

M. S. Baxter, Rochester

Cinna arundinacea *L.*
Epilobium hirsutum *L.*
Euphorbia corollata *L.*
Helianthus petiolaris *Nutt.*
Hieracium canadense *Mx.*
Onosmodium hispidissimum *Mack.*
Panicum boreale *Nash.*
P. scribnerianum *Nash*
Panicum spretum *Schultes*
Paspalum muhlenbergii *Nash*
Rynchospora alba (*L.*) *Vahl*
Sideranthus gracilis (*Nutt.*) *Rydb.*
Solidago neglecta *T. & G.*
Sphenopholis pallens (*Spreng.*)
Tilia michauxii *Nutt.*
Tridens flavus (*L.*) *Hitchc.*

C. E. Bessey, Lincoln, Neb.

Pholiota squarrosa *Muell.*

E. Bethel, Denver, Colo.

Allantonectria yuccae *Earle*
Pholiota comosa *Fr.*
Peridermium harknessiana *Moore*
Septoria samarae *Pk.*

E. F. Bigelow, Sound Beach, Conn.

Calostoma cinnabarinum *Desv.*

E. S. Black, Little Silver, N. J.

Broussonetia papyrifera (*L.*) *Vent.*

F. S. Boughton, Pittsford

Agaricus silvaticus *Schaeff.*
Boletus albus *Pk.*
Calvatia gigantea (*Batsch*)
Cortinarius napus *Fr.*
Inocybe modesta *Pk.*
Lactarius boughtoni *Pk.*
Lepiota rugoso-reticulata *Lorin.*
Thelephora willeyi *Clinton*
Verticillium agaricinum *(Lk.) Cd.*

E. L. Bradley, Cato

Hydrastis canadensis *L.*

F. J. Braendle, Washington, D. C.

Clitopilus washingtoniensis *Braend.*

S. H. Burnham, Hudson Falls

Acalpha virginica *L.*
Ascochyta menyanthis *Oud.*
Aster undulatus loriformis *Burg.*
Biatora coarctata (*Sm.*) *Nyl.*
Boletus felleus *Bull.*
Clitocybe candida *Bres.*
Clitopilus caespitosus *Pk.*
Collybia zonata *Pk.*
Cortinarius aureifolius *Pk.*
Cronartium ribicola *F. de W.*
Cycloloma atriplicifolium (*Spreng.*)
Desmodium canescens (*L.*) *DC.*
Diplodia linderae *E. & E.*
Eupatorium purpureum *L.*
Hedeoma hispida *Pursh*
Heterothecium pezizoideum (*Ach.*)
Hordeum jubatum *L.*
Hygrophorus minutulus *Pk.*
Hypoxylon morsei *B. & C.*
Lepiota clypeolaria (*Bull.*) *Fr.*
L. rubrotincta *Pk.*
Massariella scoriadea (*Fr.*) *Sacc.*
Oxybaphus floribundus *Chois.*
Pertusaria leioplaca (*Ach.*)
Placodium cerin. sideritis *Tuck.*
Pleurotus atropellitus *Pk.*
P. ulmarius Fr
Psilocybe camptopoda *Pk.*
Puccinia hieracii (*Schum.*) *Mart.*
Sedum purpureum *Tausch*
Septoria sedicola *Pk.*
S. violae *West.*
Tricholoma terreum *Schaeff.*
Triosteum perfoliatum *L.*
Veronica anagallis-aquatica *L.*

H. P. Burt, New Bedford, Mass.

Collybia maculata (*A. & S.*) *Fr.*
Stropharia semiglobata *Batsch*

G. H. Chadwick, Canton

Vicia villosa *Roth*

S. Davis, Boston, Mass.

Boletus chrysen. sphagnorum *Pk.*
Clavaria fusiformis *Sow.*
C. grandis *Pk.*
C. pallescens *Pk.*
C. platyclada *Pk.*
Clitocybe centralis *Pk.*
C. compressipes *Pk.*
C. maculata *Pk.*
Discina leucoxantha *Bres.*
Entoloma cyaneum *Pk.*
Geoglossum difforme *Fr.*
G. glabrum *Pers.*
Gomphidius gracilis *Berk.*
G. vinicolor *Pk.*
Hebeloma discomorbidum *Pk.*
H. parvifructum *Pk.*
Hygrophorus coloratus *Pk.*
H. hypothejus *Fr.*
Inocybe flocculosa (*Berk.*)
I. geophylla (*Sow.*) *Fr.*
I. umboninota *Pk.*
Leptonia longistriata *Pk.*
L. strictipes *Pk.*
Microglossum rufum (*Schw.*)
Naucoria myosotis *Fr.*
Nolanea delicatulus *Pk.*
Pholiota autumnalis *Pk.*
Tricholoma ustale *Fr.*

B. O. Dodge, Madison, Wis.

Boletus elbensis *Pk.*
Collybia lacunosa *Pk.*
Discina orbicularis *Pk.*
Lactarius zonarius (*Bull.*) *Fr.*
Lycoperdon cepiforme (*Wallr.*) *Bon.*
Marasmius minutus *Pk.*
Polyporus guttulatus *Pk.*
P. lentus *Berk.*
Steccherinum adustulum *Banker*

J. Dunbar, Rochester

Aster schreberi *Nees*
Sporobolus cryptandrus (*Torr.*) *Gray*

J. Dearness, London, Can.

Cladosporium triostei *Pk.*
Discosia artocreas (*Tode*) *Fr.*
Hypoxylon perforatum (*Schw.*)
Lachnella fraxinicola (*B. & Br.*)
Lophiostoma triseptatum *Pk.*
Ombrophila thujina *Pk.*
Pezicula acericola *Pk.*

C. E. Fairman, Lyndonville

Aleurodiscus oakesii (*B. & C.*) *Cke.*
Cytospora microspora (*Cd.*) *Rabenh.*
Dinemasporium acerinum *Pk.*
Gloeosporium caryae *E. & D.*
Hymenula olivacea *Pk.*
Naemospora croceola *Sacc.*
Peziza griseo-rosea *Ger.*
Plasmodiophora elaeagni *Schroet.*
Polyporus adustus (*Willd.*) *Fr.*
P. adus. carpineus *Sow.*
P. resinosus (*Schrad.*)
Poria aurea *Pk.*
Rhabdospora physostegiae *Pk.*
Sphaeronema acerinum *Pk.*
Sphaeropsis smil. latispora *Pk.*
Stereum complicatum *Fr.*

W. G. Farlow, Cambridge, Mass.

Polyporus sulphureus semialbinus *Pk.*

G. C. Fisher, DeFuniak Spa., Fla.

Agaricus floridanus *Pk.*

M. J. French, Utica

Boletus parasiticus *Bull.*
Hygrophorus chlorophanus *Fr.*
Polyporus radicatus *Schw.*
Lentinus lepideus *Fr.*
Stropharia bilamellata *Pk.*
Thelephora willeyi *Clinton*

H. Garman, Lexington, Ky.

Macrophoma suspecta *Pk.*

A. O. Garrett, Salt Lake City, Utah

Discula runcinata *E. & E.*
Lophodermium pinastri (*Schrad.*)

N. M. Glatfelter, St Louis, Mo.

Helvella macropus brevis *Pk.*
Panaeolus retirugis *Fr.*
Psathyra umbonata *Pk.*
Russula eccentrica *Pk.*

G. S. Graves, Newport

Fuligo ovata *(Schaeff.) Macbr.*

S. J. Greenfield, Ilion

Clavaria coralloides *L.*

J. G. Grossenbacher, Geneva

Myxosporium carpini *Pk.*

C. C. Hanmer, East Hartford, Conn.

Lepiota densifolia *Gill.*

F. D. Heald, Austin, Tex.

Cercospora kaki *E. & E.*

G. T. Howell, Rockville, Ind.

Merulius tremellosus *Schrad.*
Nolanea howellii *Pk.*
Polyporus radicatus *Schw.*
Trichia scabra *Rost.*

F. G. Howland, Saratoga Spa

Clitocybe dealbata sudorifica *Pk.*

M. E. Jones, Salt Lake City, Utah

Aecidium psoraleae *Pk.*
Cystopus candidus (*Pers.*) *Lev.*
Hyalospora polypodii (*DC.*) *Magn.*
Melampsoropsis pyrolae (*DC.*) *Arth.*
Phyllosticta arnicae *Fckl.*
Puccinia aberrans *Pk.*
P. asteris *Duby.*
P. balsamorrhizae *Pk.*
P. circaeae *Pers.*
Puccinia clarkiae *Pk.*
P. gayophyti *Billings*
P. gentianae (*Str.*) *Link.*
P. jonesii *Pk.*
Septoria lacustris *S. & T.*
Thecaphora deformans *D. & M.*
Uredo bigelowii *Thuem.*
Uromyces astragali (*Opiz*) *Sacc.*
U. borealis *Pk.*

C. H. Kauffman, Ann Arbor, Mich.

Pilocratera abnormis *Pk.*

F. D. Kern, Lafayette, Ind.

Septoria angustissima *Pk.*

L. C. C. Krieger, Cambridge, Mass.

Boletinus castanellus *Pk.*

W. T. Lakin, Cumberland, Md.

Boletus caespitosus *Pk.*

Boletus subtomentosus *L.*

H. Lansing, Albany

Agaricus placomyces *Pk.*

R. Latham, Orient Point

Apocynum cannab. pubescens (*R. Br.*)
Asclepias syriaca *L.*
Buellia myriocarpa (*DC.*) *Mudd*
Calvatia craniiformis (*Schw.*) *Morg.*
Camelina sativa (*L.*) *Crantz*
Cardamine parviflora *L.*
Carex canescens disjuncta *Fernald*
Carya alba (*L.*) *Koch*
Cinna latifolia (*Trev.*) *Griseb.*
Cladonia boryi *Tuck.*
Climacium kindbergii (*R. & C.*) *Grout*
Coronilla varia *L.*
Crepis setosa *Hall. f.*
Cyperus grayi *Torr.*
Erechtites hieracifolia (*L.*) *Raf.*
Fomes annosus *Fr.*
Gerardia maritima *Raf.*
G. purpurea *L.*
Glonium parvulum (*Ger.*) *Sacc.*
Gymnosporangium macropus *Link*
Herpotrichia diffusa (*Fckl.*) *E. & E.*
Hysterium pulicare *Pers.*
Juncus bufonius *L.*
Lecanidion indigoticum (*C. & P.*)
Lecanora varia saepicola *Fr.*
Lechea racemulosa *Mx.*
Lenzites betulina (*L.*) *Fr.*
Liatris scariosa *Willd.*
Osmorhiza claytoni (*Mx.*) *Clarke*
Panicum agrostoides *Spreng.*
P. amarum *Ell.*
Parmelia borreri rudecta *Tuck.*
P. borr. hypomela *Tuck.*
P. cetrata *Ach.*
P. colopodes (*Ach.*) *Nyl.*
P. perforata (*Jacq.*) *Ach.*
P. perfor. hypotropa *Nyl.*
Parmelia saxatilis sulcata *Nyl.*
Paspalum circulare *Nash*
P. setaceum *Mx.*
Phaeangella deformata (*Pk.*)
Physcia granulifera (*Ach.*) *Tuck.*
P. hispida (*Schreb.*) *Tuck.*
P. stellaris (*L.*) *Tuck.*
Physma luridum (*Mont.*) *Tuck.*
Picris hieracioides *L.*
Placodium cerinum (*Hoffm.*) *N. & H.*
P. ferrug. discolor *Willey*
Plantago elongata *Pursh*
Pleospora herbarum (*Pers.*) *Rabenh.*
Polygonum prolificum (*Small*)
Polyporus giganteus (*Pers.*) *Fr.*
Poria subacida vesiculosa (*B. & C.*)
Ramalina calicaris fraxinea *Fr.*
R. rigida (*Pers.*) *Tuck.*
Sabatia stellaris *Pursh*
Sagina decumbens (*Ell.*) *T. & G.*
Salix purpurea *L.*
Scirpus olneyi *Gray.*
Scleroderma flavidum *E. & E.*
Smilacina racemosa (*L.*) *Desf.*
Spartina patens juncea (*Mx.*)
Spergularia marina (*L.*) *Griseb.*
Sporobolus cryptandrus (*Torr.*)
Stipa avenacea *L.*
Teucrium canadense *L.*
Theloschistes conc. effusus *Tuck.*
T. flavicans *Wallr.*
Trametes pini (*Brot.*) *Fr.*
Trichostemma dichotomum *L.*
Usnea trichodea *Ach.*
Viburnum dentatum *L.*
V. venosum *Britton*
Vicia angust. segetalis (*Thuill.*)

C. E. Lewis, Orono, Me.

Phoma mali Schulz. & Sacc.

C. A. Mabie, Holley

Clitocybe multiceps tricholoma *Pk.*
Flammula flavida *Pers.*
Hypholoma sublateritium *Schaeff.*
Lepiota rhacodes *(Vitt.) Fr.*
Pholiota squarrosa *Muell.*
Pleurotus terrestris *Pk.*
Polyporus radicatus *Schw.*

A. H. Mackay, Halifax, Can.

Armillaria ventricosa *Pk.*
Clitocybe vilescens *Pk.*
Helvella sulcata *Afzel.*

J. A. Maney, Geneva

Peridermium pyriforme *Pk.*

E. R. Memminger, Flat Rock, N. C.

Craterellus cornucopioides *(L.) Pers.*

G. E. Morris, Waltham, Mass.

Boletus parasiticus *Bull.*
Lepiota rubrotincta *Pk.*
Pholiota autumnalis *Pk.*

M. V. Munger, Malone

Specimen of fruit of English walnut, Juglans regia *L.*, with 3-valved shell and 3-lobed seed.

J. B. S. Norton, College Park, Md.

Psathyrella disseminata (*Pers.*) *Fr.*

J. F. Peck, Rexford Flats

Two connected trunks of Ostrya virginiana *(Mill.) Koch*

F. T. Pember, Granville

Alisma plantago-aquatica *L.*
Grindelia squarrosa *(Pursh) Dunal*

L. H. Pennington, Syracuse

Fomes fraxineus *(Bull.) Fr.*
Guepinia palmiceps *Berk.*
Irpex mollis *B. & C.*
Poria floccosa *Fr.*
P. mutans *Pk.*
P. obducens *Pers.*

D. Reddick, Ithaca

Lysurus borealis *(Burt) C. G. Lloyd*

L. D. Rhind, Gloversville

Peridermium pyriforme *Pk.*

W. H. Ropes, Salem, Mass.

Agaricus campester *L.*
Cortinarius intrusus *Pk.*
Flammula pulchrifolia *Pk.*
Ornithogalum nutans *L.*

L. L. Shaff, Hannibal

Hypericum prolificum *L.*

P. Spaulding, Washington, D. C.

Cryptosphaeria populina *(Pers.)*
Cryptosporium macrospermum *Pk.*

F. C. Stewart, Geneva

Fusarium roseum *Link*
Gymnosporangium globosum *Farl.*
Hordeum trifurcatum *Jacq.*
Myxosporium castan. quercus *Pk.*
Phoma simillima *Pk.*
P. stictica *B. & Br.*
Phyllosticta betae *Oud.*
Stereum complicatum *Fr.*
Thlaspi perfoliatum *L.*

W. G. Stover, Columbus, Ohio

Marasmius delectans *Morg.*
Pleurotus corticatus *Fr.*

D. R. Sumstine, Pittsburg, Pa.

Hebeloma flexuosipes *Pk.*

K. F. Symonds, Utica.

Panus torulosus *Fr.*
Stropharia bilamellata *Pk.*

R. Thaxter, Cambridge, Mass.

Chaetomium indicum *Cd.*

C. Thom, Storrs, Conn.

Boletus subluteus *Pk.*

J. A. Thompson, Rochester

Roestelia aurantiaca *Pk.*

H. L. True, McConnelsville, Ohio

Gyromitra brunnea *Underw.*

L. Tucker & Son, Albany

Vermicularia beneficiens *Pk.*

D. B. Van Buren, Albany

Cladosporium paeoniae *Pass.* Roestelia aurantiaca *Pk.*

J. M. Van Hook, Bloomington, Ind.

Sporotrichum chryseum *Pk.* Stropharia thrausta *Kalchb.*

H. L. Wells, New Haven, Conn.

Boletus gertrudiae *Pk.* Pholiota dura *Bolt.*

H. H. Whetzel, Ithaca

Phoma simillima *Pk.*

T. E. Wilcox, Washington, D. C.

Boletus bicolor *Pk.* Boletus gracilis *Pk.*
Melanogaster durissimus *Cke.*

C. L. Williams, Glens Falls

Fusicladium dendriticum *(Wallr.)* Polypodium vulgare *L.*

D. B. Young, Albany

Cytospora salicis *(Cd.) Rabenh.* Eurotium subgriseum *Pk.*
Phoma piceina *Pk.*

SPECIES NOT BEFORE REPORTED

Amanita bisporigera Atk.

Ithaca. G. F. Atkinson. Collected by C. H. Kauffman. This appears like a dwarf white form of A. phalloides Fr.

Amanita floccocephala Atk.

Ithaca. G. F. Atkinson.

Amanita velatipes Atk.

Cortland. July. G. F. Atkinson.

Ascochyta menyanthis Oud.

Living leaves of buckbean, Menyanthes trifoliata L. Near Clemons, Washington co. August. S. H. Burnham.

Aulographum ledi n. sp.

Spots orbicular, grayish white, surrounded by a brown or purplish brown border; perithecia epiphyllous, few on a spot, elliptic

or oblong, often substellately lobed by confluence, erumpent, black, context whitish; asci obovate or subglobose; spores ovate or oblong, continuous, at length uniseptate, hyaline, 12–15 μ long, 6–8 μ thick.

Upper surface of leaves of Labrador tea, Ledum groenlandicum Oeder. Fine, St Lawrence co. August.

Remarkable and very distinct by its subglobose asci.

Maculae orbiculares, griseo-albidae, margine brunneo vel purpureo-brunneo circumdatae; perithecia epiphylla, pauca, elliptica oblongave, saepe confluentia et substellatim lobata, erumpentia, atra, contexta albida; asci obovati subglobosive; sporae ovatae oblongaeve, continuae, demum uniseptatae, hyalinae, 12–15 x 6–8 μ.

Biatora coarctata (Sm.) Nyl.

On nodules in drifting sand. Karner, Albany co. November. S. H. Burnham.

Calvatia craniiformis (Schw.) Morg.

Ground. Orient Point, Suffolk co. November. R. Latham.

Camelina microcarpa Andrz.

Grain fields. Bergen, Genesee co. June. This plant was erroneously reported as Camelina sativa (L.) Crantz. Specimens of the true C. sativa with broader seed vessels have been collected in oat fields near Orient Point by R. Latham and contributed by him to the herbarium.

Cercospora phlogina n. sp.

Spots orbicular or nearly so, .5–1 cm broad, sometimes confluent, blackish brown, usually with a small grayish center on the upper surface; hyphae epiphyllous, densely tufted, flexuous or irregular, 30–40 μ long, commonly aseptate, slightly colored; spores oblong or slightly narrowed toward the apex, 2–4-septate, 35–60 μ long, 3–4 μ thick.

Leaves of cultivated phlox. Floral Park, Nassau co. June. F. C. Stewart.

This species is related to C. omphacodes E. & H., but it differs in the characters of the spots, the position of the fungus and the thicker spores with fewer septa.

Maculae suborbiculars, .5–1 cm latae, aliquando confluentes, fuscoatrae, in centro supra griseae; hyphae epiphyllae, dense caes-

pitosae, flexuosae vel irregulares, 30–40 μ longae, vulgo aseptatae, leviter coloratae; sporae oblongae vel ad apicem attenuatae, 2–4–septatae, 35–60 x 3–4 μ.

Cladosporium paeoniae Pass.

Living leaves of paeonia. Batavia. August. D. B. VanBuren. Collected by Alice G. Fisher. The fungus forms large brown spots on the leaves. It sometimes occupies the entire leaf and kills it

Climacium kindbergii (R. & C.) Grout

Roots of trees in swampy places. Orient Point. December R. Latham.

Clitocybe biformis n. sp.

Plate VI, figures 9–15

Pileus fleshy, thin, firm, broadly convex or nearly plane, becoming centrally depressed, subumbilicate or broadly infundibuliform, glabrous, even or slightly striate on the margin, pale buff, sometimes more brightly colored in the center, flesh white or whitish, margin at first involute; lamellae thin, close, narrow, decurrent, whitish, becoming pallid or subcinnamon with age or in drying; stem equal or nearly so, firm, solid or stuffed, often curved, sometimes eccentric, tomentose at the base, colored like the pileus; spores subglobose or broadly elliptic, 5–6 μ long, 4–5 μ broad.

Pileus 2.5–7.5 cm broad; stem 2.5–3.5 cm long, 4–8 mm thick.

In mixed woods. Growing in arcs of circles. North Elba. Essex co. September.

When young the pileus is convex, when old it is centrally depressed or sometimes broadly infundibuliform. This change of shape has suggested the specific name. The change in the color of the lamellae is more remarkable. The species is closely allied to Clitocybe gilva (Pers.) Fr. from which it may be separated by the whitish color of the flesh and the peculiar change of color in the lamellae. This passes from whitish to fawn color or pale cinnamon. Its habit of growing in circles is also peculiar The mycelium binds together a mass of dirt and decaying vegetable matter. These adhere closely to the base of the stem when the mushroom is pulled from its place of growth, and make the stem appear as if bulbous.

Pileus carneus, tenuis, firmus, late convexus vel subplanus, deinde centro depressus, subumbilicatus vel late infundibuliformis,

glaber, margine levis vel striatulus, pallide luteolus, in centro aliquando luteus, carne alba albidave; lamellae tenues, confertae, angustae, decurrentes, in senectute siccitateve pallide cinnamomeae; stipes subaequalis, firmus, solidus, farctusve, aliquando curvus vel eccentricus, basi tomentosus, in colore pileo similis; sporae subglobosae vel late ellipsoideae, 5–6 x 4–5 μ.

Clitocybe maxima G. & M.

Catskill mountains. September. Mrs F. C. Sherman. North Elba. C. H. Peck. This is a large and rare species, appearing as if it might be a luxuriant development of Clitocybe infundibuliformis (Schaeff.) Fr.

Cortinarius croceofolius n. sp.

Plate VI, figures 1–8

Pileus fleshy, thin, broadly convex or nearly plane, obtuse or obtusely umbonate, dry, slightly fibrillose specially on the margin, brownish cinnamon, often paler or saffron yellow on the margin, flesh pale yellow, grayish or dingy when dry; lamellae thin, close, saffron yellow verging to orange, then brownish cinnamon, often yellow crenulate on the margin; stem equal or slightly thickened at the base, fibrillose above, saffron yellow, hollow, veil similarly colored; spores broadly ellipsoid, 6–7 μ long, 4–5 μ broad.

Pileus 2.5–5 cm broad; stem 2.5–4 cm long, 4–6 mm thick.

Mossy ground in or on the borders of woods of spruce and balsam fir trees. North Elba. September.

This species belongs to the section Dermocybe and is closely related to Cortinarius cinnamomeus (L.) Fr. and C. semisanguineus (Fr.) Kauffm. but in the color of the lamellae it is intermediate between them and from both it is readily separated by its smaller spores. From C. croceocolor Kauffm., of which I have seen no specimens, it may be separated by the darker color of the pileus and the different colors of the lamellae.

Pileus carneus, tenuis, late convexus vel subplanus, obtusus vel obtuse umbonatus, siccus, leviter fibrillosus, fusco-cinnamomeus, saepe margine pallidior vel croceus, carne flava, in siccitate grisea; lamellae tenues, confertae, croceae aurantiacaeve, demum fusco-cinnamomeae, saepe acie flavo-crenulatae; stipes aequalis vel leviter basi incrassatus, supra fibrillosus, cavus, croceus, velo croceo; sporae late ellipsoideae, 6–7 x 4–5 μ.

Cortinarius glaucopus (Schaeff.) Fr.

Woods. North Elba. September.

Cortinarius napus Fr.

Pittsford, Monroe co. September. F. S. Boughton.

Cortinarius triumphans Fr.

In groves of young deciduous trees. New Lebanon, Columbia co. September. The pileus in our specimens was viscid but glabrous.

Crataegus aristata n. sp. Sarg.

(Pruinosae)

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves ovate to oval, long-pointed and acuminate at the apex, cuneate at the entire base, finely often doubly serrate above, with straight glandular teeth and slightly divided into 4 or 5 pairs of small acuminate lobes; more than half-grown when the flowers open early in June and then yellow green, smooth and furnished with a few hairs on the midribs above, and pale below, and at maturity thick, bluish green, paler on the lower surface than on the upper surface, 4.5–6 cm long and 3–5 cm wide, with thin midribs and primary veins; petioles slender, narrowly wing-margined at the apex, slightly hairy on the upper side early in the season, soon becoming glabrous, 1–1.2 cm in length; leaves on vigorous shoots broadly ovate to slightly obovate, rounded or cuneate at the base, more coarsely serrate, conspicuously lobed, and often 7–8 cm long and 5.5–6 cm wide, with stout rose-colored midribs and petioles. Flowers 1.8–2 cm in diameter, on long slender pedicels, in 6–15-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually contracted from the base, short, broad, acuminate, glandular-serrate near the middle, slightly hairy on the inner surface, reflexed after anthesis; stamens 20; filaments persistent on the fruit; anthers pink; styles 3 or 4. Fruit ripening early in October, on long slender drooping pedicels, in few-fruited clusters, subglobose, slightly 5-angled, pruinose, bright red, marked by occasional pale dots, about 1 cm in diameter; calyx prominent with a long tube, a deep broad cavity wide and tomentose in the bottom, and spreading and reflexed lobes; flesh thick, yellow, dry and mealy; nutlets 3–5, narrowed and rounded at the apex, broader

and rounded at the base, 5.5–6 mm long and 4–4.5 mm wide, the narrow hypostyle extending to below the middle of the nutlet.

A shrub 3–4 m high, with numerous wide spreading branches and slender zigzag branchlets dark orange green and marked by pale lenticels when they first appear, becoming pale orange brown in their first season and light brown the following year, and armed with numerous stout straight or slightly curved purple spines 3.5–4.5 cm long.

Roadsides near Rossie, St Lawrence co. C. H. Peck (✻12 Re), June 12 and September 29, 1909.

Crataegus brainerdi Sarg.

Rocky places. Rossie. June. The plant reported under this name in Bulletin 75, page 12, was later decided by Professor Sargent to be a distinct species and was described and reported under the name Crataegus mellita Sarg.

Crataegus longipedunculata Sarg.

Near Canandaigua. June and October. Miss E. C. Webster.

Crataegus nemorosa n. sp. Sarg.

(Medioximae)

Glabrous. Leaves ovate, acuminate, rounded or abruptly cuneate at the base, sharply often doubly serrate with straight glandular teeth and deeply divided into 3 or 4 pairs of slender acuminate lobes usually pointing toward the apex of the leaf; about one-half grown when the flowers open at the end of May or early in June and then very thin and yellow green, and at maturity thin, blue green and lustrous on the upper surface, pale on the lower surface, 4.5–5 cm long and 3–3.5 cm wide, with thin midribs and primary veins, turning deep vinous red in the autumn on the upper side and remaining pale below; petioles slender, slightly wing-margined at the apex, glandular, with minute persistent glands, 1.5–2 cm in length; leaves on vigorous shoots broadly ovate, acute, long-pointed at the apex, rounded or truncate at the entire base, coarsely serrate, deeply lobed and often 8–9 cm long and broad. Flowers 1.5–1.8 cm in diameter, on long slender pedicels, in small 5–8-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from a wide base, short, acuminate, entire or furnished near the

middle with 1 or 2 minute glandular teeth, reflexed after anthesis; stamens 5–10; anthers pink; styles 3 or 4. Fruit on slender drooping pedicels, in few-fruited clusters, short-oblong to obovate, crimson, slightly pruinose, marked by dark dots, about 1 cm in diameter; calyx little enlarged, with a wide shallow cavity pointed in the bottom and spreading and appressed persistent lobes; flesh thin, dry and hard, green tinged with red; nutlets 2–4, broad and rounded at the apex, acute at the base, rounded and only slightly ridged on the back, 5.5–6 mm long and 3–3.5 mm wide.

A shrub 2–3 m high, with small stems covered with dark gray bark and numerous ascending and spreading branches, and slender slightly zigzag branchlets dark orange green and marked by pale lenticels when they first appear, becoming bright chestnut brown and lustrous in their first season and dark reddish brown the following year, and armed with numerous slender straight chestnut brown spines 3.5–6 cm long.

Hillsides near Painted Post, Steuben co., G. D. Cornell (✻ 119 type), September 22, 1907, May 26, 1908; C. H. Peck, June 2 and September 21, 1909; G. D. Cornell (✻ 119 A with 6–10 stamens and larger short-oblong fruit a little if at all narrowed at the base), Painted Post, September 22, 1907, May 28, 1908.

Crepis setosa Hall. f.

Orient Point. September. R. Latham.

Cryptosporium macrospermum n. sp.

Heaps scattered, at first covered by the epidermis, then erumpent through orbicular or elliptic apertures, about 1 mm broad, black, sometimes capped by a whitish or greenish white globule of spores, the spore mass enlarged and softened when moist; spores slender, fusiform, falcate or rarely sigmoid, generally subulate at one end, acute or subacute at the other, hyaline and often 2–6 nucleate, 60–80 μ long, 5–6 μ broad.

Dead bark of balsam fir, Abies balsamea (L.) Mill. Adirondack mountains, Franklin co. May. G. G. Atwood and P. Spaulding.

The fungus has so far developed only where the bark is dead and it is therefore uncertain that it causes the death of the bark and the wood beneath.

Acervuli sparsi, primus epidermide tecti, deinde per aperturas orbiculares ellipticasve erumpentes, 1 mm lati, nigri, aliquando

sporarum globulum albidum exudantes; sporae graciles, fusiformes, falcatae, rare sigmatoideae, vulgo apice subulatae, basi acutae subacutaeve, hyalinae, saepe 2–6-nucleatae, 60–90 x 5–6 μ.

Cycloloma atriplicifolium (Spreng.) Coult.

Waste places. Albany. September. S. H. Burnham.

Cytospora microspora (Cd.) Rabenh.

Dead branches of thorn bush. Medina, Orleans co. October. C. E. Fairman.

Diplodia linderae E. & E.

Dead branches of spice bush, Benzoin aestivale (L.) Nees. Tripoli, Washington co. April. S. H. Burnham.

Eccilia mordax Atk.

Near Ithaca. July. G. F. Atkinson. Collected by C. O. Smith.

Eurotium subgriseum n. sp.

Perithecia minute, 100–125 μ in diameter, densely clustered, globose or subglobose, pale yellow; spores globose, greenish yellow in mass, 6–8 μ in diameter.

Dead wood and bark of sycamore branches, Platanus occidentalis L. Brooklyn. March. D. B. Young.

This is found growing with and among the conidial form, Aspergillus subgriseus Pk. Torrey Bot. Club Bul. 22: 210. The color of this mold varies from whitish to grayish or bluish gray. The fertile hyphae are erect, continuous, 100–125 μ long and 7–8 μ thick, terminating in a subglobose vesicle 30–40 μ in diameter, on which strings of globose hyaline spores or conidia are borne. These conidia are 3.5–4 μ broad. They are smaller than those of the Aspergillus glaucus (L.) Link, the conidial form of Eurotium herbariorum (Wigg.) Link. The branches were collected in Brooklyn by J. J. Levison, May 12, 1909 but were kept in a moist atmosphere under cover for several months and the fungus probably developed during this time.

Perithecia minuta, 100–125 μ in diam., dense caespitosa, globosa subglobosave, flava; sporae globosae, flavido-virides, 6–8 μ in diam.

Gloeosporium caryae E. & D.

Leaves of hickory. Lyndonville, Orleans co. October. C. E. Fairman.

Gloeosporium divergens n. sp.

Spots large, irregular, commonly occupying the lobes and margin of the leaves, definite, pale brown, either with or without a slight inconspicuous reddish brown margin on the upper surface; heaps mostly hypophyllous, rarely epiphyllous and then chiefly along the veinlets, 120–160 μ broad, darker colored than the spots; spores narrowly elliptic or oblong, often 2-nucleate, hyaline, 10–15 μ long, 4–6 μ broad.

Living leaves of white oak, Quercus alba L. Menands, Albany co. July.

Maculae magnae, irregulares, foliorum lobas marginemque occupantes, definitae, pallide brunneae, interdum supra margine angusto inconspicuo, rufescento-brunneo; acervuli vulgo hypophylli, rare epiphylli et tunc ad venulas, 120–160 μ lati, maculis brunniores; sporae anguste ellipsoideae oblongaeve, saepe 2-nucleatae, hyalinae, 10–15 x 4–6 μ.

Grindelia squarrosa (Pursh) Dunal

Dry pastures on hillsides. Granville, Washington co. September. F. T. Pember. A showy introduced plant.

Mr Pember remarks concerning it, "I can only suggest that it may have been introduced in western grass seed. It is scattered about over two acres, and in some places constitutes nearly all the vegetation. There must be several thousand plants of it."

Helianthus petiolaris Nutt.

In a lawn. Rochester. July. M. S. Baxter. Introduced from the West. Determined by Dr P. A. Rydberg. Possibly not permanently established.

Heterothecium pezizoideum (Ach.) Flot.

Spruce bark. Black mountain, Washington co. August. S. H. Burnham.

Hygrophorus caprinus (Scop.) Fr.

Near Ithaca. November. G. F. Atkinson. Collected by C. H. Kauffman.

Hypericum prolificum L.

Hannibal, Oswego co. August. L. L. Shaff.

This is a large shrubby plant and it seems strange that it should so long have escaped detection in our State unless it is very local.

The station is on or near its northern limits. Mr Shaff writes that he first discovered the plant about 25 years ago. At that time and for 8 years after he kept sheep and the plant did not spread much. For 17 years he has kept no sheep and during this time it has spread over his pastures and now occupies about five acres.

Hypochnus tristis Karst.

On the base of young spruce trees. North Elba. September. The specimens are sterile and to this extent are doubtful. Professor E. A. Burt, specialist in this group of fungi, decides that it is probably this species.

Inocybe rimosoides n. sp.

Pileus thin, broadly campanulate or expanded, umbonate, glabrous, shining, substriate, radiately cracked, pale yellow; lamellae close, sinuate, adnexed or nearly free, pallid becoming brownish ferruginous; stem equal, glabrous, hollow, pallid; spores even, 8–10 μ long, 5–6 μ broad, cystidia none.

Pileus 2–3.5 cm broad; stem 2.5–4.5 cm long, 2–3 mm thick.

Grassy ground. Menands. August.

Related to Inocybe rimosa (Bull.) Fr. from which it may be distinguished by its paler and more acutely umbonate pileus, its hollow stem, smaller spores and the absence of cystidia.

Pileus tenuis, late campanulatus expansusve, umbonatus, glaber, nitidus, substriatus, radiate rimosus, luteolus; lamellae confertae sinuatae, adnexae vel subliberae, pallidae deinde brunneo-ferrugineae; stipes aequalis, glaber, fistulosus, pallidus; sporae leves, 8–10 x 5–6 μ cystidia nulla.

Lactarius boughtoni n. sp.

Plate VI, figures 1–7

Pileus fleshy, firm, becoming fragile with age, broadly convex nearly plane or centrally depressed, often deflexed on the margin, dark brownish red (walnut brown), flesh whitish, subconcolorous when moist, milk white very scanty or sometimes none, taste acrid; lamellae thin, close, adnate or slightly decurrent, whitish becoming pale buff or darker with age; stem firm, nearly equal, hollow, glabrous, colored like but often paler than the pileus, generally paler at the top than below and there slightly pruinose; spores subglobose, 8–9 μ long, 7–8 μ broad.

Pileus 5–10 cm broad; stem 4–10 cm long, 6–12 mm thick.

Ground in woods and in swamps. Old Forge, Herkimer co. August. F. S. Boughton. North Elba. September. C. H. Peck.

Closely allied to Lactarius rufus (Scop.) Fr. but separated by its paler lamellae, hollow stem, absence of an umbo and very scanty milk. The stem is often pointed at the base. Edible according to F. S. Boughton, who says it "entirely lost its acridity in cooking and was very fine in flavor." I have not tried it.

Pileus carneus, firmus, senectute fragilis, late convexus subplanus vel centro depressus, saepe margine deflexus, lateritius, carne albida, lacte albo, parco vel nullo, sapore acri; lamellae tenues, confertae, adnatae vel subdecurrentes, albidae vel lutescentes; stipes firmus, subaequalis, cavus, glaber, pileo in colore similis vel pallidior; sporae subglobosae, 8–9 x 7–8 μ.

Lentinus piceinus n. sp.

Pileus thin, dimidiate, sessile or with a very short stem, broadly convex or nearly plane, glabrous, pale alutaceous; lamellae few, distant, unequal, serrate-dentate, pallid; stem when present very short; spores minute, subglobose, 4–5 μ in diameter.

Pileus 8–12 mm broad; stem about 2 mm long.

Bark of red spruce, Picea rubra (DuRoi) Dietr. Long Lake, Hamilton co. July.

A small and rare species. Found but once.

Pileus tenuis, dimidiatus, sessilis vel breviter stipitus, late convexus subplanusve, glaber, subalutaceus; stipes brevissimus; sporae minutae, subglobosae, 4–5 μ in diam.

Lychnis coronaria (L.) Desr.

Canandaigua. July. Mrs E. P. Gardner. An introduced plant cultivated for ornament but sometimes escaping from cultivation.

Machaeranthera pulverulenta (Nutt.) Greene

Cobbs hill near Rochester. July. Miss F. Beckwith. Introduced from the West. Determined by Dr P. A. Rydberg.

Macrosporium heteronemum pantophaeum Sacc.

In gardens on young decaying summer crookneck squashes. Menands. August.

Marasmius contrarius n. sp.

Pileus submembraneous, broadly convex or nearly plane, often slightly uneven, glabrous, whitish or white with a brown center becoming grayish or subalutaceous in drying; lamellae thin, subdistant, sometimes branched or irregular, adnate or slightly decurrent, whitish, the interspaces slightly venose; stem slender, solid, downy, grayish-tawny, with tawny tomentum at the base, white within; spores 7–9 μ long, 4–5 μ broad.

Pileus 4–10 mm broad; stem 2–3 cm long, 1–1.5 mm thick.

Gregarious. Damp mossy places under spruce and balsam fir trees to the fallen leaves of which the stem is commonly attached. North Elba. June.

The texture of both pileus and stem is tough. The brown center often disappears in drying. This, and the whitish color changing to pale tan in drying, are such an unusual occurrence as to suggest the specific name. Related to M. ramulinus Pk. but at once separated from it by its pileus changing color in drying, its longer solid stem being more downy and tawny with a distinctly tomentose base and by its habitat.

Pileus submembraneus, late convexus subplanusve, saepe subrugosus, glaber, albus albidusve in centro brunneus, in siccitate griseus vel subalutaceus; lamellae tenues, subdistantes, aliquando irregulares vel ramosae, adnatae vel leviter decurrentes, albidae, interstitiis venosis; stipes gracilis, solidus, pubescens, fulvo-griseus, basi fulvo-tomentosus, intra alba; sporae 7–9 x 4–5 μ.

Myxosporium carpini n. sp.

Heaps minute, greenish black, nestling in the bark, covered by the epidermis; spores oblong or elliptic oblong, exuding in pale yellow tendrils, binucleate, hyaline, 8–12 μ long, 3.5–4 μ broad.

On bark of water beech, Carpinus caroliniana Walt. Geneva. June. J. G. Grossenbacher.

Acervuli minuti, in cortice nidulantes, epidermide tecti, olivaceo-nigri; sporae oblongae vel oblongo-ellipsoideae, binucleatae, hyalinae, 8–12 x 3.5–4 μ, in cirrhis exudantes.

Naemospora croceola Sacc.

Oak bark. Lyndonville. October. C. E. Fairman.

Naucoria sororia Pk.

Growing on manure. McLean, Tompkins co. September. G. F. Atkinson. This species is doubtless often confused with

Naucoria suborbicularis (Bull.) Fr. from which it is separated by its farinaceous odor and taste, its fragile character, lacunose or pitted pileus and its stem striated at the top.

Oidium asteris-punicei n. sp.

Amphigenous indeterminate, widely and thinly effused, whitish; fertile hyphae suberect, hyaline, septate, simple; spores terminal catenulate, ellipsoid or oblong, rounded or subtruncate at the ends, hyaline, 30–60 μ long, 15–20 μ broad.

Living or languishing leaves of red stemmed aster, Aster puniceus L. Letchworth Park, Wyoming co. September.

Related to Oidium erysiphoides Fr., but I find no rosy tinted tufts and the hyphae are nearly as broad as the spores. Perhaps it is the conidial stage of Erysiphe cichoracearum DC.

Amphigenum, indeterminatum, late et tenuiter effusum, albidum; hyphae fertiles suberectae, hyalinae, septatae, simplices; sporae catenulatae, acrogenae, ellipsoideae oblongaeve, utrinque obtusae subtruncataeve, hyalinae, 30–60 x 15–20 μ.

Oxybaphus floribundus Chois.

Waste places. Albany. September. S. H. Burnham. Introduced from the West but apparently well established.

Pertusaria leioplaca (Ach.) Schaer.

Bark of hop hornbeam. Ostrya virginiana (Mill.) Koch. Helderberg mountains, Albany co. May. S. H. Burnham.

Pholiota terrigena Fr.

Grassy ground. Utica. October. G. F. Atkinson. In drying, this mushroom is said to emit an odor similar to that of mice.

Phoma piceina n. sp.

Perithecia few, scattered, prominent but minute, black; spores ellipsoid or oblong, hyaline, 8–12 μ long, 4–5 μ broad.

On leaves of red spruce Picea rubra (DuRoi) Dietr. Adirondack mountains near Lake Pleasant, Hamilton co. May. D. B. Young.

In these specimens the leaves have been injured by some insect which has caused a swelling at the base and may have been the primary cause of the death of the leaves.

Perithecia pauca, sparsa, prominentia, minuta, atra; sporae ellipsoideae oblongaeve, hyalinae, 8–12 x 4–5 μ.

Phoma simillima n. sp.

Perithecia densely gregarious, slightly prominent, at first covered by the epidermis, then erumpent, convex or depressed, minute, black; spores ellipsoid, hyaline, 8–12 long, 5–8 μ broad.

Dead bark of pear trees, Pyrus communis L. Ithaca. H. H. Whetzel. Rochester. April. F. C. Stewart.

This differs from Cytospora piri Fckl., which inhabits branches of pear trees, by its much smaller spores. The perithecia commonly burst through transverse apertures in the epidermis.

Perthecia dense gregaria, leviter prominentia, primus epidermide tecta, deinde erumpentia, convexa vel depressa, minuta, atra; sporae ellipsoidea, hyalinae, 8–12 x 5–8 μ.

Phoma stictica B. & Br.

On leaves of common box tree, Buxus sempervirens L. Geneva. January. F. C. Stewart. Collected by S. M. McMurran. This Phoma is said to be the spermogonium of Diaporthe retecta (F. & N.) Sacc.

Phyllosticta betae Oud.

Living leaves of beet, Beta vulgaris L. Flint, Ontario co. August. F. C. Stewart.

Phyllosticta subtilis n. sp.

Spots suborbicular, .5–3 cm broad, sometimes confluent, indefinite, reddish brown; perithecia numerous, densely gregarious, hypophyllous, minute, 80–120 μ broad, blackish; spores minute, oblong, straight or curved, hyaline, 8–12 μ long, 1.5–2 μ broad.

Leaves of Carya. Painted Post. September.

This species departs from the ordinary character of the genus in its narrow spores.

Maculae suborbiculares, .5–3 cm latae, aliquando confluentes, indeterminatae, fuscae; perithecia numerosa, dense gregaria, hypophylla, minuta, 80–120 μ lata, nigra; sporae minutae, oblongae, rectae curvaeve, hyalinae, 8–12 x 1.5–2 μ.

Physcia hispida (Schreb.) Tuck.

On red cedar wood, Juniperus virginiana L. Orient Point. April. Sterile form. R. Latham.

Picris hieracioides L.

Orient Point. August and September. R. Latham. An introduced plant.

Pilocratera abnormis n. sp.

Cups scattered, stipitate, small, 1–4 mm broad, obconic or saucer-shaped, pale grayish, obscurely pubescent; stem 1–3 mm long, inserted or swollen at the base into a minute hairy bulb, colored and adorned like the cup; asci subcylindric, 160–200 μ long, 10–12 μ broad, spores oblong or subfusiform, straight or slightly curved, slightly narrowed toward each end, commonly containing a single large central nucleus, 25–40 μ long, 8–10 μ broad, paraphyses filiform.

Decorticated wood of yellow birch, Betula lutea Mx. Fine. August. Found also on decaying wood at Ishpeming, Michigan. August. C. H. Kauffman.

The minute pubescence is somewhat compacted into tufts on the margin but the tufts are not long enough to give a fimbriate or ciliate appearance to the margin.

Cupulae sparsae, stipitatae, parvae, 1–4 mm latae, obconicae vel acetabuliformes, pallido-griseae, minute pubescentes; stipes 1–3 mm longus, insititius vel basi bulbillosus, hirtus, cupulae in colore similis; asci subcylindracei, 160–200 x 10–12 μ; sporae oblongae subfusiformesve, rectae vel leviter curvatae, utrinque leviter angustatae, vulgo uninucleatae, 25–40 x 8–10 μ, paraphyses filiformes.

Placodium ferrugineum discolor Willey

On bark of red cedar, Juniperus virginiana L. Orient Point. April. R. Latham.

Plasmodiophora elaeagni Schroeter

On roots of Elaeagnus longipes Gray. Lyndonville. November. C. E. Fairman.

Pleurotus approximans n. sp.

Pileus thin, tough, subgelatinous, dimidiate or subflabelliform or with a short stemlike base, at first involute on the margin and more or less strigulose hairy, specially toward the base, becoming pruinose or subglabrous with the thin even margin expanded or slightly recurved, pallid, grayish brown or smoky brown, 6–12 mm broad; lamellae narrow, close, tapering toward each end, converging to a

basal point, creamy yellow, minutely bristly on the edge and sides with the projecting hyaline pointed cystidia which are 60–80 μ long, 15–20 μ broad.

On decaying wood and bark, apparently of red maple, Acer rubrum L. Sylvan Beach, Oneida co. July.

This species is closely related to Pleurotus spiculifer Berk., a species founded on specimens collected on decaying wood on New Ireland island in the Pacific ocean, and described as having the pileus very glabrous membranous and pellucidly striate, characters not applicable to our specimens. For this reason we have considered our mushroom distinct, though in other respects the characters are very similar. Our specimens revive on the application of moisture and then the flesh is colored like the surface of the pileus and subgelatinous, .4–.5 mm thick. When dry it is white, slightly thinner, and appearing to have a thin upper gelatinous layer. The spores are not known in our specimens nor described in P. spiculifer.

Pileus tenuis, lentus, subgelatinous, dimidiatus aut subflabelliformis, sessilis vel substipitatus, primo margine involutus, hirtus praesertim ad basem, demum pruinosus vel subglaber, margine tenue expanso vel leviter recurvato pallidus, griseo-brunneus vel fumoso-brunneus, 6–12 mm latus; lamellae angustae, acie lateribusque cystidiis minute setulosus; cystidia hyalina lageniformia, 60–80 x 15–20 μ.

Ramalina rigida (Pers.) Tuck.

On red cedar, Juniperus virginiana L. Orient Point. December. R. Latham.

Rhabdospora physostegiae n. sp.

Perithecia caulicolous, scattered or seriate, erumpent, globose-depressed, black; spores filiform, hyaline, nearly or quite straight, 25–30 μ long, 1–1.5 μ broad.

Dead stems of Physostegia virginiana (L.) Benth. Lyndonville. May. C. E. Fairman.

Perithecia sparsa vel seriatim posita, erumpentia, globosa depressave, atra; sporae filiformes, hyalinae, subrectae, 25–30 x 1–1.5 μ.

Sideranthus gracilis (Nutt.) Rydb.

In a lawn. Rochester. July. M. S. Baxter. Near the reservoir on Cobbs hill. Miss F. Beckwith. Introduced from the West and possibly not permanently established.

Sphaeropsis smilacis latispora n. var.

Dead branches of hispid greenbrier, Smilax hispida Muhl. Yates, Orleans co. March. C. E. Fairman.

This variety differs from the typical form in its broader spores. Spores 17–20 μ long, 11–13 μ broad. In the type they are 15–20 long, 6–8 μ broad.

Sporae 17–20 x 11–13μ.

Sporotrichum grisellum Sacc.

Dead bark. Ithaca. G. F. Atkinson. Collected by C. O. Smith.

Theloschistes flavicans Wallr.

On red cedar, Juniperus virginiana L. Orient Point. April. R. Latham. This is a beautiful lichen but the specimens are sterile.

Thlaspi perfoliatum L.

Geneva. May. F. C. Stewart. A rare plant introduced from Europe.

Trichothecium subgriseum n. sp.

Hyphae thinly effused, covering the matrix with a very thin grayish buff subvelvety stratum, sparsely branched, septate, hyaline, 6–8 μ thick; spores obovate or oblong-elliptic, simple or obscurely uniseptate, hyaline, 16–24 μ long, 8–10 μ broad.

Decaying wood of yellow birch, Betula lutea Mx. and sugar maple, Acer saccharum Marsh. Fine. August.

Apparently related to Trichothecium griseum Speg. but differing in its branching hyphae and more narrow and often simple spores.

Hyphae tenuiter effusae, matricem strato tenue, griseo-luteolo subvelutino obducentes, sparse ramosae, septatae, hyalinae, 6–8 μ latae; sporae obovatae oblongae vel ellipsoideae, continuae vel obscure uniseptatae, hyalinae, 16–24 x 8–10 μ.

Triosteum perfoliatum L.

Glenmont, Albany co. June. S. H. Burnham. The specimens formerly attributed to this species are now referred to Triosteum aurantiacum Bickn. which is the more common species in the northern part of the State.

Usnea trichodea Ach.

Orient Point. December. R. Latham. The specimens are sterile.

Vermicularia beneficiens n. sp.

Perithecia thin, depressed, orbicular or ellipsoid, .3–.5 mm broad, densely gregarious, at first covered by the epidermis, then erumpent, black, adorned with numerous black setae, sometimes paler at the top, 80–240 μ long, 4–6 μ broad; spores cylindric, straight or slightly curved, acute at one or both ends, sometimes pseudouniseptate, hyaline, 20–30 μ long, 4–4.5 μ broad; sporophores cylindric or subclavate, obtuse, crowded, 12–15 μ long.

On living stems of live-forever, Sedum purpureum Tausch. Davenport, Delaware co. July. Luther Tucker & Son. Collected by W. Gillander.

The fungus attacks the stem at or near the base which soon turns brown both without and within and becomes hollow in the affected part. The leaves, being deprived of their necessary nourishment, gradually wither, fade and drop, beginning at the lower part of the stem and gradually advancing upward until the stem is nearly or wholly denuded and finally dies. The root also early becomes discolored and must necessarily cease to perform its natural functions.

The species is similar to Vermicularia herbarum West. and may possibly have been previously confused with it, since that species has been reported as occurring on Sedum acre L., S. album L., S. maximum Suter and S. reflexum L. Our plant, however, differs not only in its host plant, but also differs from the characters assigned to V. herbarum in having the perithecia larger and densly gregarious and in having the spores longer, acute at the ends, and often spuriously septate. It also appears to be specially distinct in its parasitic character. On this account it has been announced as a beneficial fungus because of its availability as a destructive agent in destroying a weed so tenacious of life as the live-forever. This character of the fungus has suggested the specific name here assigned to it.

Perithecia tenua, depressa, orbicularia vel ellipsoidea, .3–.5 mm lata, dense gregaria, circumambientia, primum epidermide tecta, deinde erumpentia, atra, setis numerosis, rigidis, erectis vel divergentibus, acutis, atris ornata, quae aliquando apice pallescentes, 80–240 x 4–6 μ; sporae cylindraceae, rectae vel leviter curvatae, vulgo utrinque acutae, aliquando pseudouniseptatae, hyalinae, 20–30 x 4–5 μ, basidia cylindracea subclavatave, obtusa, conferta, 12–15 μ longa.

Vermicularia pomicola n. sp.

Perithecia gregarious, hemispheric or subglobose, bristly with numerous subulate black erect or divergent setae, 120–280 μ long, 7–8 μ broad; spores straight or slightly curved, pointed at each end, 25–35 μ long, 4–5 μ broad.

On apples lying on the ground. New Lebanon. September.

Spores longer than in Vermicularia pomona Sacc. which occurs on appletree leaves and is considered a variety of V. trichella Fr.

Perithecia gregaria, hemisphaerica subglobosave, setis numerosis subulatis, atris, erectis divergentibusve ornata, 120–280 x 7–8 μ; sporae rectae vel leviter curvae, utrinque acutae, 25–35 x 4–5 μ.

Verticillium agaricinum (Lk.) Cd.

On Flammula squalida Pk. Thompsons lake, Albany co. September. The parasite forms a thin whitish pruinosity on the surface of the deformed pileus. It occurs also on the pileus of Tricholoma russula (Schaeff.) Fr. at Pittsford, Monroe co. September. F. S. Boughton. The spores of the parasite are very variable, 6–12 μ long and 4–5 μ broad. The mycelium causes the pileus to become enlarged, irregular or deformed and the lamellae to become irregular and sometimes branched or even anastomosing and discolored. It is perhaps the conidial stage of some species of Hypomyces.

Viburnum venosum Britton

Orient Point. July. R. Latham. The species is well named, the veins of the leaves being very prominent and conspicuous on the lower surface.

Vicia villosa Roth

Canton, St Lawrence co. June. G. H. Chadwick. Introduced and cultivated for fodder, but escaping from cultivation and manifesting a tendency to become naturalized. The flowers are commonly blue and resemble those of Vicia cracca L. but a white flowered form occurs.

REMARKS AND OBSERVATIONS

Aster laevis L.

A very noticeable form or possibly a variety of this species occurs on Pinnacle hill near Rochester. November. Miss F. Beckwith. It differs from the common forms in its late flowering and in its long narrow panicle the branches of which are suberect, 2.5–5 cm long.

Aster undulatus loriformis Burg.

West Fort Ann, Washington co. October. S. H. Burnham.

Boletinus paluster Pk.

This beautiful small species often grows on decaying wood and the mossy bases of trees. It has a white mycelium and pale yellow flesh. Wounds of the flesh often become red after long exposure. The flavor is tardily but sharply acrid.

Brassica arvensis (L.) Ktze.

A white flowered form occurs occasionally. Menands. July.

Cantharellus infundibuliformis nigricans n. var.

Pileus blackish; hymenium very decurrent, the decurrent part destitute of lamellae. Otherwise as in the common form with which it grows.

Among mosses in swamps. North Elba. September.

Pileus nigricans; hymenium valde decurrens, pars decurrens lamellis carens.

Ceratiomyxa fruticulosa (Muell.) Macbr.

Decaying wood. Edwards, St Lawrence co. June. A yellow form occurs growing with the common white form and sometimes confluent with it.

Clitocybe multiceps tricholoma n. var.

Flesh of the pileus rather thin, taste mild; lamellae rounded behind, slightly adnexed, otherwise like the type. Holley, Orleans co. September. C. A. Mabie.

This variety, by the attachment of the lamellae, connects the species with the genus Tricholoma, to which at first sight it is likely to be

referred. The naked margin of the pileus and its close agreement in general characters with Clitocybe multiceps Pk. lead me to refer it to this species. Like it, it is edible but scarcely first quality.

Pileus tenuior, sapor mitis; lamellae adnexae.

Clitocybe dealbata sudorifica n. var.

Pileus whitish, not shining, sudorific when eaten freely. Otherwise like the typical form. Grassy ground. Saratoga Springs. November. F. G. Howland.

Pileus albidus, non nitens; sudorificus.

Mr F. G. Howland recently reported to me that the white washed mushroom, Clitocybe dealbata Sow. when eaten freely caused profuse perspiration. I, with others, had eaten sparingly of this mushroom several years ago without experiencing any ill effects. At my request he kindly sent me a good supply of the fresh mushrooms that I might try them myself. Eight caps of average size were fried slightly in butter with a little milk and flour added. These were eaten at supper time. In texture and flavor no fault could be found with them. In about half an hour perspiration began to appear on my forehead, and gradually spread over the whole body. It lasted about five hours. It was unaccompanied by any pain or distress of any kind. There seemed to be a slight acceleration of the pulse, an unusual catarrhal discharge from the nostrils, a little stimulation of the salivary glands and an occasional hiccup. At the end of five hours the perspiration ceased, I fell asleep and slept till morning when I arose feeling as well as usual. This peculiar action of the mushroom suggested the thought that possibly I had erroneously referred our mushroom to C. dealbata; that it must be some other closely related species for no record of such effects had been attributed to the white washed mushroom by those writers who have published it as edible. A careful comparison of our specimens with the published descriptions of the white washed mushrooms revealed no well-marked characters by which to separate them. In the color of the cap alone does there appear to be any available mark of distinction. This, in the white washed mushroom, is described as white and rather shining, or as one writer expresses it, "exceedingly like ivory." In our plant it is better described as whitish, or dull white, not at all shining. So close is the morphologic relationship that it appears to me to be better to separate the mushroom under con-

sideration as a mere variety of the white washed mushroom and not as a distinct species. I would not class it as an edible mushroom but rather as a medicinal one. Its physiologic effects apparently separate it more decidedly than any of its external characters.

Clitocybe morbifera Pk., collected by F. J. Braendle near Washington, D. C., is a closely related species. Its name was suggested by the fact that those eating it had been made sick. In the dried state it is scarcely distinguishable from our sudorific mushroom in external appearance, but its stem is hollow. When fresh its pileus is tinged with grayish brown, but it becomes paler in drying. This has also been collected near Minneapolis, Minn., whence it was sent by Mrs M. E. Whetstone with an account of a case of short illness caused by it in one who ate freely of it for breakfast. Dr O. E. Fisher has sent specimens of it from Detroit, Mich., with an account of the sickness it produces and the accompanying symptoms. From these cases it appears that the ill effects of the sickening mushroom are much more serious and uncomfortable than those of the sudorific mushroom.

Cornus canadensis elongata n. f.

Stem elongated, bearing a pair of opposite leaves at each of three or four nearly equidistant nodes, or bearing a whorl of four leaves near the base and two or three pairs of opposite leaves above, instead of the usual peduncle and flower cluster. Cranberry marsh, Sand Lake, Rensselaer co. and Averyville marsh, North Elba. July and September. Sterile.

This peculiar form has the appearance of Cornus suecica L., the northern dwarf cornel, but its leaves have the venation of the common dwarf cornel. No flowering or fruiting specimens were seen.

Crataegus grayana Eggleston

This rare thorn bush occurs in a single clump on Crown Point west of the ruins of Fort Frederick. At Rossie it is represented by several clumps near the Laidlaw house and a single outlying clump about two miles south of the village.

Cronartium ribicola F. de W.

Leaves of red currant, Ribes vulgare Lam. West Fort Ann. October, 1909. S. H. Burnham. This is an interesting discovery of a new locality for this fungus of which the uredo

form is the white pine rust Peridermium strobi Kleb., a pernicious pest destructive to young white pines. This station is far removed from the one originally discovered at Geneva. Fortunately it is apparently very scarce in this new locality. In neither instance was any white pine found to be affected by the rust. The question arises in each case. Whence came the spores that infected the currant leaves? Can the fungus perpetuate itself without the intervention of the white pine rust?

Daphne mezereum L.

This early spring flowering shrub is quite hardy and escaping from cultivation it becomes established in pastures and waste places. It is beautiful both in flower and in fruit. Fine specimens were contributed by Miss E. W. Mische and Mrs L. L. Goodrich. They were collected near Homer, Cortland co. and were so abundant on a hillside near the cemetery that they were cut with a scythe as if they were noxious weeds.

Euphorbia corollata L.

Sandy barrens near Bushnells Basin and Perinton, Monroe co. July and August. M. S. Baxter. This rare plant is apparently limited to the western part of the State.

Fuligo ovata (Schaeff.) Macbr.

This is one of our largest slime molds and one of the most variable in external color. A specimen found near Newport, Herkimer co. by G. S. Graves was 25 cm long, 20 cm broad and about 6 cm thick.

Glonium parvulum (Ger.) Sacc.

Decorticated wood. Orient Point. January. R. Latham. Rare.

Herpotrichia diffusa (Schw.) Ellis

In Sylloge this species stands under the name Herpotrichia rhodomphala (Berk.) Sacc. Under this name it was recorded in the Annual Report of the State Botanist for 1889, page 34. Specimens found at Orient Point in March by R. Latham have some of the perithecia wholly red, others partly so. They were growing on decaying wood of locust, Robinia pseudacacia L.

Hordeum trifurcatum Jacq.

Cultivated specimens from Medina were contributed by F. C. Stewart. It is cultivated under the name of beardless barley and is said to be very productive. It sometimes springs up spontaneously. Such specimens were erroneously reported under the name Hordeum hexastichon L.

Hydrastis canadensis L.

This valuable medicinal plant has become exceedingly rare in our State. It is therefore very gratifying to know that it still exists in Cayuga co., whence fruiting specimens were sent by E. L. Bradley.

Lecanora varia saepicola Fr.

On fence rails. Orient Point. April. R. Latham.

Lepidium draba L.

Waste ground in Syracuse near Onondaga creek. June. Mrs L. L. Goodrich. Collected by Miss Belle Douglass. This introduced plant was found many years ago near Astoria, Queens co. by Prof. D. C. Eaton, but that station for it has since been reported as destroyed.

Mycogone cervina subincarnata Pk.

In State Museum Report 32, page 44 this fungus was reported as a Sepedonium. It should be referred to the genus Mycogone and is a mere variety of Mycogone cervina Ditm. differing only in its smaller spores and more pinkish color. Its habitat is the same as that of the typical form. The spores are 20–28 μ long, 12–20 μ broad in the widest part. The upper cell is globose, verrucose, and much larger than the smooth lower cell.

Sporae subincarnatae, 20–28 x 12–20 μ.

Myxosporium castaneum quercus n. var.

Heaps slightly prominent, orbicular or oblong, erumpent through transverse chinks of the epidermis. Otherwise like the type.

Branches of chestnut oak, Quercus prinus L. Riverhead, Suffolk co. October. F. C. Stewart.

Acervuli minuti, orbiculares oblongive, per rimulas transversas in epidermide erumpentes.

Oidium destruens Pk.

This destructive parasitic fungus begins its work early in the season. Young leaves of the shad bush Amelanchier oblongifolia (T. & G.) Roem. were found near Albany affected by it the last week in April.

Parmelia borreri hypomela Tuck.

Bark of red cedar, Juniperus virginiana L. Orient Point. April. R. Latham.

Parmelia perforata hypotropa Nyl.

Bark of red cedar, Juniperus virginiana L. Orient Point. April. R. Latham.

Peronospora ficariae Tul.

Living leaves of buttercup, Ranunculus acris L. Menands. May.

Plantago media L.

Near Canandaigua. August. Miss E. C. Webster. This introduced plantain is rare. Its spikes resemble those of the English plantain but it is easily distinguished from that species by the broad, hoary pubescent leaves.

Polypodium vulgare L.

A singular small sterile fern which, on account of its venation has been referred to this species, was collected near Lake George and specimens were contributed by C. L. Williams and Mrs S. W. Russell.

The fronds are 5–12 cm long, 1–2 cm broad, sinuate lobed or irregularly pinnatifid, the lobes being broad, obtuse and unequal.

Ramalina calicaris fraxinea Fr.

Orient Point. November. R. Latham.

Roestelia aurantiaca Pk.

The orange colored rust occurs on various species of shad bush, Amelanchier, and of thorn bushes and trees, Crataegus. Also on quince trees. It attacks the leaves, fruit and sometimes the twigs. Its alternate form is Gymnosporangium clavipes

C. & P. which lives on red cedar, Juniperus virginiana L. and the common juniper, J. communis depressa Pursh. The spores of the Gymnosporangium are produced in spring and serve to infect species of shad bushes, thorn bushes and quince bushes or trees, but instead of reproducing the Gymnosporangium in them, they develop into the orange rust or Roestelia, whose spores are carried back to the red cedar or common juniper and produce in them the Gymnosporangium. The Roestelia frequently causes great loss to quince growers by attacking the young quinces and rendering them worthless. Fine specimens of it were contributed by Messrs J. A. Thomson, D. B. VanBuren, and G. G. Atwood. Quince fruits from 1–1.5 inches in diameter were practically covered by the cups of the fungus filled with their orange colored spores. In some cases even the twigs bearing the fruit had been invaded and were swollen by the fungus. This rust appears to have been unusually abundant the past season, in the western part of the State. Mr D. B. Van Buren found quince orchards there badly infested by it, even in localities where no red cedar trees were known to exist within many miles. This would indicate that the orange rust has some way of reproducing itself without the intervention of the red cedar or that some unnoticed juniper trees may exist in the vicinity of these orchards and furnish the Gymnosporangium spores. Experiments should be made by which the fact can be ascertained if the orange rust can reproduce itself in the quince either the same or the following year. Also if the mycelium may live in the twigs during the winter and renew the development of the rust in the leaves and fruit developing from the infested twigs.

Sagina decumbens (Ell.) T. & G.

Orient Point. June. R. Latham. This is a rare and delicate little plant.

Scirpus occidentalis (Wats.) Chase

Canandaigua. August. Miss E. C. Webster. The longer spikes separate this species from its near relative Scirpus validus Vahl. The plant previously reported under this name proves to be a mere form of S. validus Vahl.

Sphaerotheca humuli (DC.) Burr.

Living leaves and aments of hop vines. Middleburg, Schoharie co. G. G. Atwood. The fungus attacks the leaves, diminishing their vigor; also the aments or fruit, arresting their proper development and causing partial or sometimes serious failure of the crop.

Sporobolus cryptandrus (Torr.) Gray

Sandy soil. Webster, Monroe co. September. J. Dunbar. Orient Point. September. R. Latham. Not common.

Thaspium barbinode (Mx.) Nutt.

Rocky places near Corning. May. Rare or wanting in the eastern part of the State.

Theloschistes concolor effusus Tuck.

On bark of trees. Orient Point. January. R. Latham.

Valsonectria parasitica (Murrill) Rehm

Bark of chestnut, Castanea dentata (Marsh.) Borkh. Marlboro, Ulster co. July.

This fungus was described under the name Diaporthe parasitica, but it does not well agree with the character of that genus, inasmuch as it has a bright colored perithecium instead of a black one. It agrees much better in this respect with the genus Valsonectria. The locality here mentioned is the most northern, with one exception, of any known to me. It is also the first one in which I have seen a tree affected by this fungus, though I have looked for it for three seasons whenever I have been where chestnut trees are common. Specimens have been seen that were collected at Visher Ferry, Saratoga co. This is the most northern station for it known to me. It has been reported to have been found at Cooperstown but no specimens from that locality have been seen by me.

Viburnum dentatum L.

A form with leaves decidedly acuminate was found at Orient Point in July by R. Latham.

Vicia angustifolia segetalis (Thuill.) Koch

Orient Point. July. R. Latham.

Viola pallens (Banks) Brainerd

In woods. Edwards. May. This violet was formerly confused with Viola blanda Willd. It is separated from it by the dull reddish spots of the petioles and scapes, the bearded lateral petals and the broader upper petals. In our specimens the capsules are subglobose and about twice as long as the sagittate sepals.

NEW SPECIES AND VARIETIES OF EXTRALIMITAL FUNGI

Agaricus floridanus

Pileus hemispheric or campanulate, becoming nearly plane, rimosely areolate or slightly strigose, becoming glabrous, whitish with a yellow or yellowish center; lamellae at first white, then pink, finally dark brown or blackish; stem easily separable from the pileus, equal or slightly thickened at the base, solid, becoming fibrous when old, whitish, annulus small; spores globose or broadly elliptic, 5–6 μ long, 4–5 μ broad.

Pileus 9–15 cm broad; stem 5–10 cm long, 1.5–3 cm thick.

Single or subcespitose. Grassy fields of sandy soil. DeFuniak Springs, Florida. March. G. Clyde Fisher.

The mycelium often binds the particles of sand into a globose mass which adheres to the base of the stem. This gives the stem a bulbous appearance, though it is not strictly bulbous. This species is apparently closely allied to Agaricus campester americanus Speg. a South American species. It may be separated from that variety by its rimosely areolate pileus, its stem easily separating from the pileus, solid and not bulbous, and by its smaller annulus. The spores are the same size in both and smaller than in the common mushroom. In both the lamellae are at first white.

Pileus hemisphericus campanulatusve, deinde subplanus, rimose areolatus substrigosus, demum glaber, albidus, in centro luteus vel flavidus; lamellae primo albae, deinde incarnatae, postremo atro-brunneae vel nigricantes; stipes ex pileo facile separabilis, aequalis vel basi subincrassatus, solidus, in senectute fibrosus, albidus, annulus parvus; sporae globosae vel late ellipsoideae, 5–6 x .4–5 μ.

Boletus gertrudiae

Pileus fleshy, broadly convex, glabrous, soft, dry or nearly so, orange yellow or brownish yellow, rarely bright yellow, flesh white, unchangeable; tubes long, bright yellow when young, brownish yellow when mature, adnate or but slightly rounded at the stem, the mouths minute; stem rather long, equal or nearly so, solid, glabrous, yellow above, white below, white within or sometimes more or less yellow within the upper part; spores oblong fusiform, 15–20 μ long, 5–6 μ broad.

Pileus 5–12 cm broad; stem 10–15 cm long, 12–24 mm thick.

Ground in woods. Old Lyme, Connecticut. August. H. L. Wells.

This is a fine large species with a beautifully colored stem, the upper half usually bright yellow, the lower half white. The two colors sometimes blend into each other and sometimes are quite definitely terminated. They grow scattered but sometimes two with stems united at the base. The pileus is apt to be badly infested by insect larvae. This species may well commemorate Miss Gertrude Wells who, though young in years, has already manifested a remarkable interest in mushrooms and a wonderful proficiency in the knowledge of them.

Pileus carneus, late convexus, glaber, mollis, siccus, aurantiaco-luteus vel brunneo-luteus, rare flavidus, carne alba, immutabile; tubuli longi, primus flavidi, deinde fulvo-ochraecei, adnati vel circum stipitem leviter depressi, pori minuti; stipes longus, subaequalis, solidus, glaber, supra flavidus, infra albus, carne intra alba, vel supra flavida; sporae oblongae vel fusiformes, 15–20 x 5–6 μ.

Cercospora verbenae-strictae

Spots numerous, small, angular, yellowish green; hyphae hypophyllous, tufted, short, simple, slightly colored, 20–40 μ long, 4–5 μ broad; spores slender, commonly tapering upward, obscurely 3–6-septate, hyaline, 20–100 μ long, 3–4 μ broad.

Lower surface of living or languishing leaves of Verbena stricta Vent. Stockton, Kansas. August. E. Bartholomew and W. T. Swingle.

Maculae numerosae, parvae, angulares, luteo-virides; hyphae hypophyllae, caespitosae, breves, simplices, leviter coloratae, 20–40 x 4–5 μ; sporae graciles, vulgo sursum attenuatae, obscure 3–6-septatae, hyalinae, 20–100 x 3–4 μ.

Clitocybe subnigricans

Pileus fleshy in the center, thin toward the margin, convex becoming nearly plane, glabrous, whitish or smoky white, flesh whitish, slowly changing to grayish on exposure to the air, taste slightly and tardily acrid, odor earthy, slightly pungent and disagreeable, persistent, lamellae thin, narrow, close, slightly or in some specimens very much decurrent, whitish becoming blackish where bruised and in drying; stem solid, slightly fibrous striate, somewhat thickened or distinctly bulbous at the base, colored like

the pileus but becoming blackish in drying; spores white, 6–7 μ long, 4–6 μ broad.

Pileus 2.5–5 cm broad; stem 4–7.5 cm long, 6–12 mm thick.

Subcespitose or gregarious. Rye Beach, New Hampshire. G. B. Fessenden.

A fine species easily distinguished by its strong odor and the blackening of the lamellae and stem where bruised and in drying.

Pileus carneus, ad marginem tenuis, convexus, demum subplanus, glaber, albidus vel fumoso-albus, caro albida, vulnera ad griseum tarde mutantia, sapor leviter et tarde acris, odor terrenus, ingratus, persistens; lamellae tenues, angustae, confertae, leviter vel valde decurrentes, albidae, ubi vulneratae nigricantes et in siccitate; stipes solidus, leviter fibroso-striatus, basi incrassatus vel bulbosus, albidus, in siccitate nigricans; sporae albae, 6–7 x 4–6 μ.

Clitopilus washingtoniensis Braend. in lit.

Pileus thin, broadly convex, nearly plane or centrally depressed, sometimes undulate on the margin, glabrous, at first bluish, soon pale purple or mauve, flesh white, taste mild; lamellae narrow, close, decurrent, slightly tinged with pink; stem short, central, eccentric or almost lateral, equal or tapering downward, fibrillose and longitudinally rimulose, solid, brownish; spores elliptic, 6–7 μ long, 4–5 μ broad.

Pileus 1.6–2.5 cm broad; stem 1–2 cm long, 2–4 mm thick.

Gregarious or cespitose. Washington, D. C. June. F. J. Braendle.

Remarkable for the peculiar colors of the pileus and for its variable attachment to the stem.

Pileus tenuis, late convexus subplanus vel in centro depressus, glaber, aliquando margine undatus, primus subcaeruleus deinde pallide purpureus, carne alba, sapore miti; lamellae angustae, confertae, decurrentes, subincarnatae; stipes brevis, centralis, eccentricus vel sublateralis, aequalis vel infra attenuatus, fibrillosus, in longum rimulosus, solidus, brunneus; sporae ellipsoideae, 6–7 x 4–5 μ.

Coniothecium perplexum

Effused, forming a thin black crust; hyphae inconspicuous, short, continuous, creeping, colored, 3–4 μ in diameter; spores minute, subglobose or irregular, colored, 4–6 μ in diameter, persistently adhering and forming subglobose, irregular or oblong opaque masses, 20–40 μ in diameter or 20–35 μ long, 40–60 μ broad.

Decaying wood of ash posts below the surface of the ground. Stockton, Kansas. December. E. Bartholomew.

Effusum, stratum tenue nigrum formans; hyphae inconspicuae, breves, continuae, repentes, fuscae, 3–4 μ crassae; sporae minutae, subglobosae vel irregulares, fuscae, 4–6 μ in diam., persistenter adherentes, acervulosque subglobosos, irregulares vel oblongos nigricantes formantes, 20–40 μ in diam. vel 20–35 x 40–60 μ.

Cylindrosporium conservans

Spots numerous, amphigenous, suborbicular, sometimes confluent, 1–3 mm broad, green; acervuli epiphyllous, commonly 1–6 on a spot; spores filiform, curved, 40–75 μ long, 3–4 μ broad, oozing out and forming persistent whitish or honey colored masses or tendrils.

Leaves of Scouler's willow, Salix scouleriana Barr. Rolling Bay, Washington. August. E. Bartholomew.

The spots are surrounded by the yellow or greenish yellow tissue of the leaves, the fungus apparently preventing the discoloration of the tissues in proximity to it. This character is suggestive of the specific name. The center of the spots appears paler on the upper surface because of the spore masses.

Maculae numerosae, amphigenae, suborbiculares, aliquando confluentes, 1–3 mm latae, virides; acervuli epiphylli, vulgo 1–6 in quavis macula; sporae filiformes, 40–75 x 3–4 μ, curvatae, exundantes et massas aut claviculas persistentes albidas melleasve formantes.

Diaporthe callicarpae

Stroma effused, thin, blackening the surface of the wood; perithecia immersed in the wood, commonly 2–6, depressed-globose, .3–.5 mm broad, black, ostiola minute, barely emerging from the blackened surface of the wood and rupturing the epidermis; asci very slender, narrowed at each end, 60–80 μ long, 6–8 μ broad, spores distichous, 4-nucleate, 12–15 μ long, 3–4 μ broad.

Dead stems of Sambucus callicarpa Greene. Rolling Bay, Washington. August. E. Bartholomew.

This species belongs to the section Euporthe. The spores and asci are very slender and the septum of the former is scarcely perceptible.

Stroma effusum, tenue, ligni superficiem nigricans; perithecia in ligno immersa, vulgo 2–6, depresso-globosa, .3–.5 mm lata, nigra,

ostiola minuta ligni superficiem vix superantia; asci graciles, utrinque attenuati, 60–80 x 6–8 μ; sporae distichae, 4-nucleatae, 12–15 x 3–4 μ.

Diplodia alni-rubrae

Perithecia densely gregarious, sunk in the bark, covered by the slightly elevated epidermis, .3–.5 μ broad; spores ellipsoid or broadly ellipsoid, oozing out and staining the matrix black, 16–20 μ long, 10–14 μ broad.

Rolling Bay, Washington. August. E. Bartholomew.

The dead bark of Alnus rubra Bong. Closely related to Diplodia alni Fckl., but with shorter and broader spores which emerge and stain the matrix black.

Perithecia dense gregaria, in cortice insculpta, epidermide leviter elevata tecta, .3–.5 μ lata; sporae ellipsoideae vel late ellipsoidae, exudantes matricemque inquinantes, 16–20 x 10–14 μ.

Flammula graveolens

Pileus fleshy, broadly convex or nearly plane, sometimes slightly depressed in the center, viscid, glabrous or very obscurely innately fibrillose, reddish brown or yellowish brown, at first paler on the margin, the thin pellicle subseparable, flesh pale yellow, odor strong, earthy; lamellae thin, moderately close, adnate or slightly decurrent, pale yellow becoming subferruginous; stem equal or tapering at the base, solid or with a very narrow cavity, silky fibrillose, pale yellow without and within, becoming brownish at the base, veil floccose or webby, pale yellow, visible in the young plant, soon disappearing; spores brownish ferruginous, elliptic, 6–8 μ long, 4–5 μ broad.

Pileus 2.5–7 cm broad; stem 5–7 cm long, 5–10 mm thick.

Under pine trees. West Gloucester, Massachusetts. October. Mrs E. B. Blackford.

A species well marked by its pale yellow flesh veil and stem, its viscid pileus, brownish ferruginous spores and strong odor. It is sometimes cespitose.

Pileus carneus, late convexus vel subplanus, aliquando in centro depressus, viscidus, glaber aut obscure fibrillosus, rufo-brunneus vel flavo-brunneus, primus margine pallidior, pellicula tenue subseparabile, carne flavida, odore grave, terraneo; lamellae tenues subconfertae, adnatae, vel subdecurrentes, flavidae, deinde subferrugineae; stipes aequalis vel basi attenuatus, solidus vel leviter cavus,

sericeo-fibrillosus, extra intraque flavidus, demum basi brunneus, velum floccosum arachnoideumve, flavidum, evanescens; sporae brunneo-ferruginosae, ellipsoideae, 6–8 x 4–5 μ.

Hebeloma flexuosipes

Pileus thin, convex, glabrous, slightly viscid when moist, dingy buff or clay brown, flesh white; lamellae close, adnate, brownish ferruginous; stem fibrous, equal or slightly thickened at the base, flexuous, solid or stuffed, pruinose-pubescent and minutely glandular at the top, pallid or similar to the pileus in color, with an abundant white fibrillose mycelium at the base, veil none; spores subellipsoid, brownish ferruginous, 12–16 μ long, 7–9 μ broad.

Pileus 2.5–6 cm broad; stem 3.5–7.5 cm long, 4–8 mm thick.

Ground. Schenley park, Pittsburg, Pennsylvania. July. D. R. Sumstine. Said to be edible.

Pileus tenuis, convexus, glaber, viscidulus, luteolus vel argillaceo-brunneus, carne alba; lamellae confertae, adnatae, brunneo-ferrugineae; stipes fibrosus aequalis vel leviter basi incrassatus, flexuosus, solidus farctusve, ad apicem pruinoso-pubescens et minute glandulosus, pallidus vel pileo in colore similis, velo nullo, mycelio fibrilloso, abundante, candido; sporae subellipsoideae, brunneo-ferruginosae, 12–16 x 7–9 μ.

Helminthosporium subapiculatum

Tufts effused, black; hyphae erect, rigid, subflexuous, often nodulose and irregular above, obscurely septate, variable in length, 8–10 μ thick; spores variable, oblong or subfusiform, 6–7-septate, 35–80 μ long, 12–16 μ broad.

Dead wood of Sambucus callicarpa Greene. Rolling Bay, Washington. August. E. Bartholomew.

It is related to Helminthosporium apiculatum Cd. but differs in its longer oblong spores without an apiculus.

Caespites effusi, atri; hyphae erectae, rigidae, subflexuosae, saepe superne nodulosae et irregulares, obscure septatae, 8–10 μ crassae; sporae variables, oblongae vel subfusiformes, 6–7-septatae, 35–80 x 12–16 μ.

Hormiscium ambrosiae

Tufts commonly effused, black; chains of spores persistent, straight or slightly curved, commonly tapering toward the apex or broader in the middle and tapering toward each end, 40–100 μ long;

spores subglobose, commonly broader than long, colored, smooth, 4–16 in a chain, 6–10 μ long, 8–18 μ broad.

On dead stems of Ambrosia trifida L. Louisville, Kansas. September. E. Bartholomew.

Caespites vulgo effusi, atri; catenae sporarum simplices persistentes, rectae vel leviter curvatae, vulgo ad apicem attenuatae vel in parte media latiores utrinque angustatae, 40–100 μ longae; sporae subglobosae, leves, fuscae, 4–16 in quavis catena, 6–10 x 8–18 μ.

Hypoxylon bartholomaei

Stroma effused, thin, about 1 mm thick, 2–3 cm long, .5–1 cm broad, subelliptic, sometimes with a slight narrow sterile black margin, even, black, opaque; perithecia monostichous, subglobose, .5 mm broad, the ostiola scarcely visible; asci cylindric, 160–200 μ long, 8–12 μ broad; spores monostichous, ellipsoid, at first pale and 1–2-nucleate, then colored, 16–24 μ long, 8–12 μ broad; paraphyses filiform.

On decorticated wood of red alder, Alnus rubra Bong. Rolling Bay, Washington. August. E. Bartholomew.

The distinguishing characters of this species are the thin subelliptic stroma and its dull even black surface. The ostiola are not visible to the naked eye. The young conidial state not seen.

Stroma effusum, tenue, circiter 1 mm thick, 2–3 cm longum, .5–1 cm latum, subellipticum, leve, atrum, opacum; perithecia monosticha, subglobosa, .5 mm lata, ostiola vix visibilia; asci cylindracei, 160–200 x 8–12 μ; sporae monostichae, ellipsoideae, primo pallidae, uninucleatae vel binucleatae, deinde coloratae, 16–24 x 8–12 μ; paraphyses filiformes.

Lepiota allenae

Pileus thin, conic, convex or campanulate, widely striate on the margin, unpolished, whitish or tinged with pale yellow, often yellowish brown in the center; lamellae thin, 1–2 mm broad, free, close, whitish or tinged with pale yellow; stem slightly tapering upward, glabrous, hollow, colored like the pileus, the annulus slight, persistent or evanescent; spores broadly ellipsoid or subglobose, 5–7 μ long, 4–6 μ broad.

Pileus 8–15 mm broad; stem 12–20 mm long, 1–2 mm thick.

Cespitose. In a greenhouse. Newtonville, Massachusetts. August. Miss L. C. Allen.

This is a small delicate, beautiful, and nearly uniformly colored species. The small smooth disk is sometimes brown or yellowish brown and in very young plants looks like a cap on the apex of the small undeveloped pileus. It may possibly be an introduced species. It is respectfully dedicated to its discoverer.

Pileus tenuis, conicus, convexus campanulatusve, margine late striatus, impolitus, albidus flavidusve, saepe in centro flavido-brunneus; lamellae tenues, 1–2 mm latae, liberae, confertae, albidae flavidaeve; stipes supra leviter attenuatus, glaber, cavus, pileo in colore similis, annulus parvus, persistens vel evanescens; sporae late ellipsoideae, vel subglobosae, 5–7 x 4–6 μ.

Leptonia longistriata

Pileus conic or convex, submembranous, fragile, umbilicate, subhygrophanous, squamulose, striatulate nearly or quite to the umbilicus both when moist and when dry, grayish brown; lamellae thin, fragile, subdistant, eroded or wavy on the edge, whitish becoming flesh color; stem straight, slender, tough, glabrous, shining when dry, hollow, colored like the pileus with a white mycelium at the base; spores irregular or angular, uninucleate, 12–16 μ long, 8–10 μ broad.

Pileus 1–1.5 cm broad; stem 3–5 cm long, 1–2 mm thick.

Ground by roadsides. Stow, Massachusetts. August. S. Davis.

The distinguishing character of this species is the widely striated margin which is suggestive of the specific name.

Pileus conicus convexusve, submembranaceus, fragilis, umbilicatus, subhygrophanus, squamulosus, fere ad umbilicum striatulatus, griseo-brunneus; lamellae tenues, fragiles, subdistantes, acie erosae undulataeve, albidae deinde incarnatae; stipes strictus, gracilis, lentus, glaber, in siccitate nitens, cavus, in colore pileo similis, basi mycelio albido; sporae irregulares angularesve, uninucleatae, 12–16 x 8–10 μ.

Leptonia strictipes

Pileus thin, campanulate or convex, obtuse or slightly umbilicate, even or striatulate on the thin margin, yellow brown or dark brown; lamellae thin, narrow, close, adnate or slightly sinuate with a decurrent tooth, dusted and subincarnate by the spores; stem long, slender, straight, glabrous, hollow, equal or slightly tapering upward, with a whitish mycelium at the base; spores angular, uninucleate, commonly with an oblique apiculus at one end, 10–14 μ long, 7–9 μ broad.

Pileus 1.5–2.5 cm broad; stem 6–8 cm long; 2–3 mm thick.

Among sphagnum. Taylor's swamp, Stow, Massachusetts. August. S. Davis.

Known by its variously colored pileus and long straight stem. It is a larger species than Leptonia longistriata Pk. to which it is closely related, and has a different habit and habitat and smaller spores.

Pileus tenuis, campanulatus convexusve, obtusus vel leviter umbilicatus margine tenue levis striatulatusve, flavo-brunneus vel nigro-brunneus; lamellae tenues, angustae, confertae, adnatae vel leviter sinuatae dente decurrente; sporis pulverulentae, subincarnatae; stipes longus, gracilis, rectus, glaber, cavus, aequalis vel sursum leviter attenuatus, basi mycelio albido; sporae angulares, uninucleatae, vulgo oblique apiculatae, 10–14 x 7–9 μ.

Macrophoma suspecta

Perithecia minute, 120–160 μ broad, gregarious or scattered, occupying large areas on the upper surface of the lower leaves, at first covered by the epidermis, then erumpent, thin, convex, orbicular, opening by a pore, black; spores oblong or cylindric, obtuse, hyaline, continuous, 2–4-nucleate, 12–18 μ long, 4–5 μ broad.

Dead basal leaves of winter wheat, Triticum vulgare Vill. Lexington, Kentucky. May and June. H. Garman.

Related to Phoma hennebergii J. Kuehn but differing in its place of growth and in its broader spores and perithecia. It is suspected of killing the host plant, hence the specific name. This is very distinct from Colletotrichum cereale Manns, which is parasitic on wheat, rye, oats, barley and various grasses in Ohio.

This species is a good illustration of the difficulty sometimes encountered in assigning definite limits to a genus. The genus Macrophoma was first suggested by Professor Saccardo as one that might be instituted for the reception of species of Phoma having rather thick perithecia and spores. Berlese and Voglino, acting on this suggestion, instituted the genus Macrophoma and included in it species whose spores should equal 15 μ or more in length. The spores in the species here described vary in length from 12–18μ. It therefore stands on the border line between Phoma and Macrophoma and so far as this character goes might be placed in either genus. Because some of the spores exceed the limiting dimension we have placed the species in Macrophoma.

thought it might be possible to find an occasional perithecium in which no spores would be 15 μ long.

Perithecia minuta, 120–160 μ in diam., gregaria sparsave, foliorum basalium areas magnas occupantia, primum epidermide tecta, tenua, convexa, orbicularia, poro aperientia, atra; sporae oblongae vel cylindraceae, utrinque rotundatae, hyalinae, continuae, 2–4-nucleatae, 12–18 x 4–5 μ.

Microdiplodia viciae

Perithecia hypophyllous, sometimes amphigenous, thin, covered by the epidermis, erumpent, black, 80–120 μ in diameter; spores at first hyaline, then colored, ellipsoid or oblong, 8–12 μ long, 4–5 μ broad, not at all or but slightly constricted at the septum.

Dead leaves of linear leaved vetch, Vicia linearis (Nutt.) Greene. Stockton, Kansas. May. E. Bartholomew.

The spores are similar in size and shape to those of Microdiplodia mori Allesch., but the habitat is so distinct it is scarcely probable that the two can be the same.

Perithecia hypophylla, aliquando amphigena, tenua, epidermide tecta, erumpentia, nigra, 80–120 μ in diam.; sporae primo hyalinae, demum fuscae, ellipsoideae oblongaeve, 8–12 x 4–5 μ, non aut vix constrictae ad septum.

Nolanea howellii

Pileus thin, conic or convex, minutely tomentulose, intensely blue; lamellae broad, adnate, subdistant, pale yellow or straw color, becoming flesh color; stem slender, equal, hollow, glabrous, but covered with white silky fibrils at the base, colored like the pileus; spores oblong or subglobose, angular, with an oblique apiculus at the base, 10–12 μ long, 7–8 μ broad.

Pileus 1–2 cm broad; stem 4–6 cm long, 1–2 mm thick.

Among fallen leaves in damp places in thick woods. Rockville, Indiana. September. G. T. Howell.

Colored much like Nolanea atrocyanea Clem. but a much larger species. From N. caelestina Fr. it scarcely differs except in the yellowish color of the young lamellae, the uniform deep blue color of the pileus and the longer stem with white silky fibrils at the base. Respectfully dedicated to its discoverer.

Pileus tenuis, conicus convexusve, minute tomentosulus, intense caeruleus; lamellae latae, adnatae, subdistantes, stramineae, deinde incarnatae; stipes gracilis, aequalis, cavus, glaber, basi fibrillis albis

sericeis tectus, pileo in colore similis; sporae oblongae subglobosaeve, angulares, oblique apiculatae, 10–12 x 7–8 μ.

Ombrophila thujina

Cups minute, .5–.75 mm broad, scattered or subcespitose, sessile or subsessile; hymenium plane or convex, not or scarcely margined, pale orange; asci oblong or subclavate, 90–100 μ long, 15–20 μ broad; spores crowded or distichous in the asci, oblong or subfusiform, rounded at the ends, hyaline, 18–22 μ long, 6–8 μ broad; paraphyses filiform, free at the tips.

Smooth bark of the branches of white cedar, Thuja occidentalis L. Near London, Ontario. J. Dearness.

This differs from Ombrophila enterochroma (Pk.) Sacc. in being less distinctly stipitate or sessile, in retaining its color in drying, in its less fusiform spores and in the free, not agglutinate, apices of its asci and paraphyses.

Ascomata minuta, .5–.75 mm lata, sparsa vel subcaespitosa, sessilia vel subsessilia; hymenium planum vel convexum, submarginatum, pallide aurantiacum; asci oblongi vel subclavati, 90–100 x 15–20 μ; sporae in ascis confertae vel subdistchae, oblongae vel subfusiformes, utrinque rotundae, hyalinae, 18–22 x 6–8 μ; paraphyses filiformes, apicibus liberis.

Ovularia stachydis-ciliatae

Spots angular, 2–5 mm broad, limited by the veinlets, subconfluent, pale yellowish green, sometimes becoming brownish or reddish brown; hyphae hypophyllous, very short, hyaline; spores very variable, globose, obovate or ellipsoid, hyaline, 6–16 μ long, 6–12 μ broad.

Living leaves of Stachys ciliata Dougl. Alki Point, Washington. August. E. Bartholomew.

The hyphae and spores form a thin inconspicuous grayish covering on the spots beneath.

Maculae angulares, 2–5 mm latae, venulis limitatae, subconfluentes, pallide flavo-virides, aliquando brunnescentes vel rufobrunneae; hyphae hypophyllae, brevissimae, hyalinae; sporae variabiles, globosae, obovatae vel ellipsoideae, hyalinae, 6–16 x 6–12 μ.

Phyllosticta paupercula

Spots very small, .5–1 mm broad, numerous, sometimes confluent, angular or suborbicular, reddish brown or whitish, scarcely

visible on the lower surface of the leaf; perithecia minute, epiphyllous, one or two on a spot, black; spores ellipsoid, 4–6 μ long, 3–3.5 μ broad.

Living leaves of cultivated Amelanchier alnifolia Nutt. Stockton, Kansas. September. E. Bartholomew.

Closely related to Phyllosticta prunicola (Op.) Sacc., P. mahaleb Thuem. and P. mespili Sacc. but easily distinguished by the peculiarly colored and very small spots and by the small number of the perithecia on a spot.

Maculae minutae, .5–1 mm latae, numerosae quandoque confluentes, angulares aut suborbiculares, rufo-brunneae vel albidae, infra vix visibiles; perithecia minuta, epiphylla, in aliqua macula unum duove, atra; sporae ellipsoideae, 4–6 x 3–3.5 μ.

Russula eccentrica

Pileus fleshy but thin, firm, eccentric or deformed, at first centrally depressed, with even incurved margin, becoming nearly plane, dry, glabrous, brownish or brownish gray, faintly reddish brown when dry, flesh white, odor disagreeable; lamellae thin, subdistant, broad, adnate or adnexed, pallid or tinged with pink, becoming reddish where wounded, reddish brown and subpruinose with age or in drying; stem smooth, equal, spongy within, white; spores subglobose, even or nearly so, 6–7 μ in diameter.

Pileus 5–10 cm broad; stem 4–6 cm long, 1.5–3 cm thick.

Grassy ravine in open oak woods. Near St Louis, Missouri. August. Rare and local. N. M. Glatfelter.

This is the third species known in which wounds assume a reddish color. From Russula nigricans (Bull.) Fr. it differs in its dry and eccentric pileus not becoming blackish and from R. densifolia Secr. in its eccentric pileus and subdistant pinkish tinted lamellae. It belongs to the section Compactae.

Pileus carneus, tenuis, firmus, eccentricus vel deformatus, primus centro depressus, margine leve incurvato, deinde subplanus, siccus, glaber, brunneus vel brunneo-griseus, siccitate leviter rufo-brunneus, carne alba, odore ingrato; lamellae tenues, subdistantes, latae, adnatae vel adnexae, pallidae vel subincarnatae, rufescentes ubi vulneratae, in aetate vel siccitate rufo-brunneae et subpruinosae; stipes aequalis, levis, intus spongiosus, albus; sporae subglobosae. subleves, 6–7 μ in diam.

Septoria aceris-macrophylli

Spots distinct, orbicular, 3–8 mm broad, amphigenous, pale reddish, slightly paler in the center; perithecia minute, 1/6 mm broad, on the upper surface of the leaf, central, few, black; spores filiform, curved, 20–40 μ long, 1.5–2 μ broad.

Living leaves of Acer macrophyllum Pursh. Port Madison, Washington. August. E. Bartholomew.

Maculae distinctae, suborbiculares, 3–8 mm latae, amphigenae, pallide rufescentes, centro leviter pallidiores; perithecia minuta, 1/6 mm lata, in pagina folii superiore, centralia, pauca, nigra; sporae filiformes, curvae, 20–40 x 1.5–2 μ.

Septoria angustissima

Spots amphigenous, .5–1.5 cm broad, sometimes confluent and occupying half the leaf or more, reddish brown above, paler beneath, not brown margined; perithecia mostly epiphyllous, densely gregarious, orbicular, about .5 mm broad, depressed or broadly conic, opening by a central pore, black; spores filiform, extremely slender, curved or straight, continuous, eguttulate, hyaline, 18–30 μ long, scarcely 1 μ broad; sporophores shorter and thicker.

On leaves of osage orange, Maclura pomifera (Raf.) Schneider. Aberdeen, Mississippi. August. F. D. Kern. Collected by T. C. Frye.

Remarkable for its very narrow spores.

Maculae amphigenae, .5–1.5 cm latae, aliquando confluentes foliique partem dimidian occupantes, supra rufo-brunneae, infra pallidiores; perithecia vulgo epiphylla, dense gregaria, orbicularia depressa vel late conica, poro aperientia, nigra; sporae filiformes, pergraciles, curvatae rectaeve, hyalinae, eguttulatae, 18–30 x 1 μ; sporophori breviores et crassiores.

Septoria ficarioides

Spots amphigenous, suborbicular, usually only one or two on a leaf, pallid; perithecia few, epiphyllous, 100–150 μ in diameter, black; spores filiform, straight or slightly curved, hyaline, 25–40 long, 1–2 μ broad.

Leaves of Ranunculus cymbalaria Pursh. Wood River, Nebraska. July. E. Bartholomew. Collected by J. M. Bates.

Closely related to Septoria ficariae Desm. but differing in the color of its spots and in its larger and black perithecia, fewer on a spot, and in its different host plant.

Maculae amphigenae, suborbiculares, in folio quoque vulgo unus vel duo, pallidae; perithecia, pauca, epiphylla, 100–150 μ in diam., atra; sporae filiformes, rectae vel curvulae, hyalinae, 25–40 x 1–2 μ.

Septoria samarae

Perithecia minute, 80–120 μ in diameter, numerous, amphigenous, occupying the whole wing of the fruit, superficial, black; spores filiform, curved or rarely flexuous, hyaline, 22–44 μ long, 1.5–2 broad.

Wing of the fruit of box elder, Acer negundo L. and the dwarf mountain maple, Acer glabrum Torr. Morrison, Colorado. September. E. Bartholomew. Collected by E. Bethel. Golden, Colorado. E. Bethel.

The wings have lost their green color, but the covering of the seed is still green.

Perithecia minuta, 80–120 μ in diam., numerosa, amphigena omnino fructus alam occupantia, superficialia, atra; sporae filiformes curvatae vel rare flexuosae hyalinae 22–44 x 1.5–2 μ.

Sphaeromyces delphinii

Subiculum of few radiating branched colored hyphae; sporophores short, very dense; spores catenulate, oblong or subfusiform, forming a dense subglobose brown or black mass, subhyaline by transmitted light, 8–12 μ long, 1.5–2 μ broad.

Dead stems of western larkspur, Delphinium occidentale Wats. August. Salt Lake co., Utah. E. Bartholomew. Collected by A. O. Garrett.

In the spore character this species does not agree well with the character of the genus to which it is here referred, but it seems better to place it here than to make a new genus for its reception. Both it and the species on which the genus was founded are manifestly very rare. In some of the specimens the sporodochium appears to sit upon a gelatinous film which at length becomes blackened by a layer of the fallen spores.

Subiculum hyphis paucis, radiantibus, fuscis, sparse ramosis compositum; sporophori breves, densissimi; sporae catenulatae oblongae vel subfusiformes, massam subglobosam densam fuscam nigramve formantes, subhyalinae sub lente, 8–12 x 1.5–2 μ.

Sphaeropsis melanconioides

Perithecia membranous, orbicular or discoid, 1–2 mm broad, wanting or scarcely developed above, numerous, nestling in the bark to which it is adnate at the base, erumpent, black; spores compact, ellipsoid or oblong, 16–24 long, 10–12 μ broad, supported on more or less slender filiform hyaline sporophores.

Dead branches of Ailanthus glandulosus Desf. Stockton, Kansas. September. E. Bartholomew.

The perithecia are so imperfectly developed that the fungus might easily be mistaken for a species of Melanconium. Hence the specific name.

Perithecia membranacea, orbicularia discoideave, 1–2 mm lata, parte superiore carentia, numerosa, in cortice nidulantia, basi adnata, erumpentia, atra; sporae compactae, ellipsoideae oblongaeve, 16–24 x 10–12 μ, sporophoris hyalinis gracilibus vel filiformibus suffultae.

Sporotrichum chryseum

Hyphae slender, 3–4 μ thick, continuous, long, intricate, hyaline, forming a soft thin subrosy separable membrane, golden yellow beneath; spores abundant, minute, globose, 2.5–3 μ in diameter.

On the hymenium of a resupinate form of Fomes conchatus (Pers.) Fr. Bloomington, Indiana. J. M. VanHook.

The spores appear to give the yellow color to the under surface.

Hyphae graciles, 3–4 μ crassae, continuae, longae, intricatae, hyalinae, membranam mollen tenuem subroseam separabilem subter aureum formanies; sporae abundantes, minutae, globosae, 2.5–3 μ in diam.

Basidiophora kellermanii paupercula

Spots few, small, more scattered, snowy white; oospores globose, smaller, 20–24 μ in diameter.

Living leaves of Iva xanthifolia Nutt. Chama, New Mexico. August. E. Bartholomew. Collected by W. T. Swingle.

Maculae paucae, parvae, sparsiores, candidae; oosporae globosae, minores, 20–24 μ in diam.

Boletus chrysenteron sphagnorum

Pileus hemispheric or very convex, reddish brown, the extreme margin thin, slightly surpassing the hymenium, incurved, flesh white or whitish; tubes longer than the thickness of the flesh.

Pileus 2–3 cm broad; stem 2–4 cm long, 5–8 mm thick.

Among sphagnum. Stow, Massachusetts. September. S. Davis.

The peculiar habitat, deeply convex reddish brown pileus with its slightly extended incurved margin and white flesh are distinguishing features of this variety. In the last mentioned character it resembles Boletus albocarneus Pk.

Pileus hemisphaericus convexissimusve, badius, praeter lamellas margine tenue incurvo extentus, carne alba albidave; tubuli pilei carnis carassitate longiores.

Melanconium bicolor candidum

This differs from the typical form in having the stroma pure white and the spores obovate or narrowed toward one end.

Bark of red mulberry, Morus rubra L. Rolling Bay, Washington. July. E. Bartholomew.

Stroma candidum; sporae obovatae vel basi angustatae.

EDIBLE FUNGI

Boletus albus Pk.

WHITE BOLETUS

Plate 121, figures 1–5

Pileus convex, viscid when moist, white, flesh white or yellowish; tubes small or medium, subrotund, adnate, whitish becoming yellow or ochraceous; stem short, equal or slightly tapering downward, glandular dotted, white; spores ochraceous, subfusiform, 8–9 μ long, 4–4.5 μ broad.

The white boletus is easily distinguished from all our other species by its white viscid cap and its glandular dotted stem. Its cap varies in its horizontal diameter from 1.5–3.5 inches. It is generally convex, but in large plants it is often expanded until it is nearly or quite plane. Its white color is not well retained in drying. It is therefore important to see fresh specimens in order to identify the species satisfactorily. The flesh is white or barely tinged with yellow. Sometimes the fresh plant emits a peculiar, somewhat fetid or strong, odor.

The tubes in the young plant are whitish or but slightly tinged with yellow, but when mature they are ochraceous and the mouths are dotted with dark reddish brown glands. The stem is short, generally less than the diameter of the cap, cylindric or slightly narrowed at the base, solid, without any collar, dotted with reddish

brown glands and white or sometimes tinged with pink at the base. It occurs in the vicinity of pine and hemlock trees during July and August. It is not very common. It has an agreeable flavor, is tender and harmless.

Cantharellus aurantiacus (Wulf.) Fr.

ORANGE CHANTARELLE FALSE CHANTARELLE

Plate 122, figures 8–16

Pileus fleshy, soft, minutely tomentose, plane or centrally depressed, yellowish orange, sometimes tinged with smoky brown or brownish in the center only, flesh whitish or yellowish; lamellae narrow, close, decurrent, repeatedly forked, reddish orange, sometimes yellowish orange; stem equal or slightly tapering upward, solid, glabrous, colored like or paler than the pileus; spores subellipsoid, 6–8 μ long, 4–5 μ broad.

The orange chantarelle is sharply separated from the other species by its usually bright orange gills which are regularly and repeatedly forked. The cap varies from 1–3 inches broad and its upper surfaces may be convex, nearly flat or centrally depressed. It is soft in texture and covered with a minute scarcely visible tomentum. Its color is commonly a pale yellowish orange or tawny orange more or less suffused with a dull smoky tint. Sometimes the center is more distinctly brownish than the margin. The extreme margin is frequently decurved or involute. The flesh is soft, whitish or slightly yellowish.

The gills are very pretty by reason of their commonly bright orange color and regular forking.

The stem is 1–3 inches long and 2–5 lines thick. It is solid, equal in diameter throughout its length or sometimes slightly narrowed upward. In color it is generally similar to the cap, though usually paler and sometimes even darker or blackened toward the base.

There is a rare form in which the cap is white or nearly so. There is also a variety p a l l i d u s Pk. in which both cap and gills are pale yellow or whitish yellow. It occurs in swamps.

The orange chantarelle occurs most often in woods and uncultivated places in hilly and mountainous regions from July to October. It was formerly reputed poisonous or dangerous and credited with having a disagreeable flavor. In my own experiments with it the flavor has been found to be agreeable and fair trials of eating it have shown it to be perfectly harmless. I therefore have no hesitation in adding it to our list of edible species.

Lactarius camphoratus (Bull.) Fr.

CAMPHORY LACTARIUS

Plate 126, figures 1–7

Pileus thin, convex, nearly plane or centrally depressed, often with a small umbo, glabrous, dry, bay red or brownish red, flesh tinged with the color of the pileus, milk white, taste mild; lamellae thin, narrow, close, adnate or slightly decurrent, dull reddish or similar to the pileus; stem subequal, glabrous, stuffed or hollow, colored like or a little paler than the pileus; spores globose, white, 8–9 μ in diameter.

The camphory lactarius is closely related to the sweetish lactarius, Lactarius subdulcis (Bull.) Fr. from which it is separated by its darker red color and its agreeable odor. In color it approaches Lactarius rufus (Scop.) Fr. from which its smaller size and mild taste easily separate it. Its umbo, when present, is very small and its margin is sometimes wavy. The color is generally bay red, but occasionally it approaches the color of the cap of the sweetish lactarius from which the odor is then the most available character for the separation of these species.

The gills also are occasionally paler than usual and thereby tend to the confusion of these two species. The odor is less pronounced in the fresh plant than in the dry. It becomes more distinct in drying and persists a long time. It is not like that of camphor as the name would suggest, but resembles more the odor of dried melilot. It is not always wholly dispelled by cooking, but the flavor is not in our opinion a serious objection to the edibility of this mushroom. It occurs in swamps, wet places and in woods from July to September.

Lactarius lignyotus Fr.

SOOTY LACTARIUS

Plate 123, figures 1–6

Pileus convex, plane or slightly depressed, dry, with or without a small umbo, often radiately wrinkled in the center, pruinosely velvety, even on the margin or crenately lobed and distantly but briefly plicate striate, sooty brown, flesh white, milk white, taste mild or tardily and slightly acrid; lamellae subdistant, adnate or slightly decurrent, white or creamy yellow, assuming reddish tints

where wounded; stem equal or tapering upward, stuffed, rather long, colored like the pileus; spores globose, echinulate, 8–10 μ in diameter.

The sooty lactarius is a very noticeable species, well marked by its dark brown color, velvety appearance, long stem and wounds of the gills and flesh slowly assuming reddish hues.

The cap varies from 1–4 inches broad, and is usually marked in the center by slight radiating rugosities or wrinkles. It is often marked by a small central prominence. Its dark sooty color and soft velvety appearance are attractive features. The margin is sometimes even, sometimes scalloped and marked with short parallel striations.

The gills are moderately distant from each other, and vary in color from white to creamy yellow or pale ochraceous. Where cut or broken the wounds slowly assume a reddish tint. The milk is scanty, white and mild.

The stem is generally from 2–4 inches long and 2–4 lines thick, but sometimes these dimensions are exceeded. It is often abruptly narrowed at the top and there slightly striate. Its color is like that of the cap.

It occurs most often in hilly or mountainous places, growing in shaded, mossy or damp places in woods and swamps. It is an excellent edible species, and occurs from July to September.

Variety tenuipes Pk. has the pileus about 1 inch broad, and the stem 2–3 inches long and about 2 lines thick.

Lycoperdon atropurpureum Vitt.

PURPLE SPORED PUFF BALL

Plate 121, figures 6–10

Peridium variable in size and shape, 1–2 inches broad, globose, subglobose or obovoid, clothed with slender hairs or spinules which are longer and convergent on the upper part of the peridium, shorter or wanting on the lower part, grayish, brownish or blackish above, paler below, easily rubbed off, commonly disappearing from the mature peridium, the young peridium is whitish below, tinged with gray or brown above, the whole becoming at last smooth, shining and brown, the interior at first fleshy, white, becoming olivaceous with age and finally purplish brown, dry and dusty; the threads of the capillitium are branched, the main stem is about equal in thickness to the diameter of the spores; spores purplish brown, globose, warted, 5–7 μ in diameter.

Ground in woods or in bushy places. August to September. Common.

This, like other puff balls, is edible only while the flesh is clear white. When it assumes a yellow hue it is no longer palatable and when it becomes dry and dusty with the mature spores no one would think of eating it. In the edible state the texture and color of the flesh of this species may be compared to those of a very fine grained soft cottage cheese.

CRANBERRY AND AVERYVILLE MARSHES

Cranberry marsh is in the eastern part of the town of Sand Lake, Rensselaer county. It is an irregular oblong marsh apparently about a half mile long and one-fifth mile broad in its widest part. A sluggish stream flows centrally through its longest diameter. Sphagnum moss is plentiful and forms a soft carpet over most of its surface. Cranberries were formerly produced on it in great abundance, but now these plants are limited to the banks of the stream and a few of the more wet and boggy places. The surface of the marsh is mostly much more firm than it was sixty years ago. Shrubs are more numerous and widespread and small coniferous trees have sprung up in some of the older parts. Some of the orchids that beautified the marsh less than twenty-five years ago have now nearly or quite disappeared. The purple fringed orchis is no longer found there, and of the white fringed orchis only a single flowering specimen was seen in my recent visits. The bladder-fruited or bottle sedge, which formerly bore seed freely there, has now become smaller, less vigorous and completely sterile. The changed conditions induced by the destruction of the surrounding forests and the often recurring summer drouths are gradually exterminating those plants that require a more uniform temperature and constant moisture. The advancing shrubs crowd out or overpower the weaker and less persistent herbaceous plants. This marsh is steadily approaching the shrubby stage in which sphagnum and marsh herbs will scarcely be able to maintain their existence. The number of species of flowering plants and ferns found in this marsh is 76.

Averyville marsh is in the town of North Elba, Essex county. It is about three miles south of Lake Placid. It is apparently about one mile long and one-third mile broad in its widest part. Near the middle it is much more narrow than toward either end by reason of the encroachment of the forest on both sides. This con-

traction in width divides it into two nearly equal parts, the northern and southern. Chub river runs through its longest diameter from south to north. At the contracted part and for a short distance north of it the river runs close to the margin of the forest on the eastern side, leaving most of the marsh here on the west side of the river. In the rest of the marsh the river is more central. This marsh is peculiar in having the two parts wholly unlike in character and representative of two different kinds of marsh. The northern part is a shrubby marsh. Low shrubs like Labrador tea, sheep laurel, pale laurel, bog rosemary and leather leaf have taken almost complete possession. The usual marsh herbs are nearly exterminated except along the banks of the river and in a few low places. The sphagnum has a dwarf, starved appearance and is evidently struggling for existence. A few dwarf, unthrifty black spruce and tamarack trees are scattered here and there over this part of the marsh. The balsam fir is strangely absent from the open space, but it occurs sparingly along the margin. It is apparently less fitted to endure the unfavorable conditions of the marsh than either the black spruce or the tamarack.

The southern part is a grassy marsh. It is locally known as a "beaver meadow." It is mostly occupied by grasses and sedges. Blue joint grass, Calamagrostis canadensis (Mx.) Bv. and slender sedge, Carex filiformis L. are the prevailing species. They are so abundant that in past times it was customary to mow this part of the marsh and stack the hay till winter when it would be possible to draw it away and make use of it. The scaffoldings of the stacks are still in place, but as this marsh hay is of inferior quality it is not now gathered, other hay of better quality being available. It is remarkable that not a single example of the slender sedge gave any evidence of having borne fruit this season. My visit was too late in the season to find fruit on the plant, but a careful search for old fruit-bearing stems was vain. Possibly the previous cuttings of the plants weakened their fruiting capacity till now they depend entirely on offshoots or stolons for propagation. On the contrary, the blue joint grass was fruiting freely.

The grassy marsh, like the open prairie, appears to be unfavorable to the production of trees. No spruce or tamarack trees were seen in this part of the marsh. Even the shrubs that are so abundant in the northern part are mostly wanting here. Those that do appear are chiefly along or near the river.

The number of species of flowering plants and ferns found in this marsh is 57. This is considerably less than the number found in Cranberry marsh, though the area of the marsh is apparently more than twice as large. On the other hand, but one visit was made here and that so late in the season that probably some early flowering herbaceous species were overlooked.

A list of the names of the species found in each marsh is given below. It will be seen that 33 species are common to both marshes. This is more than half the number of species found in Averyville marsh. These are species likely to be found in most of our larger cold sphagnum bogs and marshes. They are the active agents in the formation of peat beds and in preparing the marsh for the habitation of the larger shrubs and trees. In other words, they are the forerunners of swamps, the trees and shrubs of which, in turn, prepare the way for productive lowland meadows and truck gardens. Of the 33 species common to the two marshes 15, or nearly half, are trees or shrubs. This indicates an advanced stage of the marshes toward a wooded swamp. In Bonaparte swamp the number of trees and shrubs is 29, in Cranberry marsh 20, in Averyville marsh 21. The number of species common to the three marshes is 19. In the following list of species will be found the names of the species of each of the two marshes and those common to the three marshes.

Plants of Cranberry marsh, Sand Lake, Rensselaer co.

Abies balsamea *(L.) Mill.*
Acer rubrum *L.*
Alnus incana *(L.) Moench*
Andromeda glaucophylla *Lk.*
Arisaema triphyllum *(L.) Schott*
Aspidium cristatum *(L.) Sw.*
A. noveboracense *(L.) Sw.*
Aster puniceus *L.*
Calamagrostis canadensis *(Mx.)*
Calla palustris *L.*
Calopogon pulchellus *(Sw.) R. Br.*
Carex canescens *L.*
C. filiformis *L.*
C. folliculata *L.*
C. intumescens *Rudge*
C. leptalea *Wahl.*
C. limosa *L.*
C. magellanica *Lam.*
C. pauciflora *Lightf.*
Carex stell. angustata *Carey*
C. trisperma *Dew.*
C. utriculata *Boott*
Chamaedaphne calyculata *(L.)*
Chelone glabra *L.*
Cinna latifolia *(Trev.) Griseb.*
Cornus canadensis elongata *Pk.*
Drosera longifolia *L.*
D. rotundifolia *L.*
Dulichium arundinaceum *L.*
Epilobium palustre *L.*
Eriophorum callitrix *Cham.*
E. virginicum *L.*
Galium palustre *L.*
Gaultheria procumbens *L.*
Glyceria canadensis *(Mx.) Trin.*
G. pallida *(Torr.) Trin.*
G. torreyana *(Spreng.)*
Habenaria blephariglottis *(Willd.)*

Habenaria clavellata *(Mx.)*
Hypericum virginicum *L.*
Impatiens biflora *Walt.*
Iris versicolor *L.*
Kalmia angustifolia *L.*
K. polifolia *Wang.*
Larix laricina *(DuRoi) Koch*
Ledum groenlandicum *Oeder*
Lycopodium inundatum *L.*
Lycopus virginicus *L.*
Lysimachia terrestris *(L.) BSP.*
Menyanthes trifoliata *L.*
Nemopanthes mucronata *(L.) Trel.*
Nymphaea advena *Ait.*
Picea mariana *(Mill.) BSP.*
P. rubra *(DuRoi) Dietr.*
Pinus strobus L.
Pogonia ophioglossoides *(L.)*
Polygonum sagittatum *L.*
Potomogeton epihydrus *Raf.*
Pyrus melanocarpa *(Mx.) Willd.*
Rosa blanda *Ait.*
Rubus hispidus *L.*
R. triflorus *Richards.*
Rynchospora alba *(L.) Vahl*
Sarracenia purpurea *L.*
Scheuchzeria palustris *L.*
Scutellaria lateriflora *L.*
Sparganium minimum *Fr.*
Spiraea latifolia *Borkh.*
Trientalis americana *Pers.*
Utricularia cornuta *Mx.*
Vaccinium canadense *Kalm*
V. corymbosum *L.*
V. macrocarpon *Ait.*
V. oxycoccos *L.*
V. pennsylvanicum *Lam.*
Viburnum cassinoides *L.*

Plants of Averyville marsh, North Elba, Essex co.

Abies balsamea *(L.) Mill.*
Agrostis hyemalis *(Walt.) BSP.*
Alnus incana *(L.) Moench*
Andromeda glaucophylla *Lk.*
Aspidium cristatum *(L.) Sw.*
Aster puniceus *L.*
A. umbellatus *Mill.*
Bromus altissimus *Pursh*
Calamagrostis canadensis *(Mx.)*
Campanula aparinoides *Pursh*
Carex filiformis *L.*
C. leptalea *Wahl.*
C. pauciflora *Lightf.*
Chamaedaphne calyculata *(L.)*
Cicuta bulbifera *L.*
Cirsium muticum *Mx.*
Cornus canadensis elongata *Pk.*
C. stolonifera *Mx.*
Dalibarda repens *L.*
Epilobium palustre *L.*
Eriophorum callitrix *Cham.*
E. virginicum *L.*
Eupatorium purpureum *L.*
Galium asprellum *Mx.*
Gaultheria procumbens *L.*
Gentiana linearis *Froel.*
Glyceria canadensis *(Mx.) Trin.*
Hippuris vulgaris *L.*
Hypericum ellipticum *Hook.*
Hypericum virginicum *L.*
Iris versicolor *L.*
Juncus brevicaudatus *(Engelm.)*
Kalmia angustifolia *L.*
K. polifolia *Wang.*
Larix laricina *(DuRoi) Koch*
Ledum groenlandicum *Oeder*
Lysimachia terrestris *(L.) BSP.*
Nemopanthes mucronata *(L.) Trel.*
Nymphaea hybrida *(Pk.)*
Picea mariana *(Mill.) BSP.*
Potamogeton epihydrus *Raf.*
Pyrus americana *(Marsh.) DC.*
P. melanocarpa *(Mx.) Willd.*
Rubus triflorus *Richards.*
Salix rostrata *Richards.*
Sambucus canadensis *L.*
Senecio robbinsii *Oakes*
Solidago altissima *L.*
S. serotina *Ait.*
S. uliginosa *Nutt.*
Spiraea latifolia *Borkh.*
Thalictrum polygamum *Muhl.*
Thuja occidentalis *L.*
Vaccinium canadense *Kalm*
V. oxycoccos *L.*
V. pennsylvanicum *Lam.*
Viburnum cassinoides *L.*

Common to the two marshes

Abies balsamea *(L.) Mill.*
Alnus incana *(L.) Moench*
Andromeda glaucophylla *Lk.*
Aspidium cristatum *(L.) Sw.*
Aster puniceus *L.*
Calamagrostis canadensis *(Mx.)*
Carex filiformis *L.*
C. leptalea *Wahl.*
C. pauciflora *Lightf.*
Chamaedaphne calyculata *(L.)*
Cornus canadensis elongata *Pk.*
Epilobium palustre *L.*
Eriophorum callitrix *Cham.*
E. virginicum *L.*
Gaultheria procumbens *L.*
Glyceria canadensis *(Mx.) Trin.*
Hypericum virginicum *L.*
Iris versicolor *L.*
Kalmia angustifolia *L.*
K. polifolia *Wang.*
Larix laricina *(DuRoi) Koch*
Ledum groenlandicum *Oeder*
Lysimachia terrestris *(L.) BSP.*
Nemopanthes mucronata *(L.) Trel.*
Picea mariana *(Mill.) BSP.*
Potamogeton epihydrus *Raf.*
Pyrus melanocarpa *(Mx.) Willd.*
Rubus triflorus *Richards.*
Spiraea latifolia *Borkh.*
Vaccinium canadense *Kalm*
V. oxycoccos *L.*
V. pennsylvanicum *Lam.*
Viburnum cassinoides *L.*

Common to the two marshes and Bonaparte swamp

Abies balsamea *(L.) Mill.*
Alnus incana *(L.) Moench*
Andromeda glaucophylla *Lk.*
Aster puniceus *L*
Calamagrostis canadensis *(Mx.)*
Chamaedaphne calyculata *(L.)*
Carex filiformis *L.*
C. leptalea *Wahl.*
Epilobium palustre *L.*
Eriophorum callitrix *Cham.*
E. virginicum *L.*
Glyceria canadensis *(Mx.) Trin.*
Hypericum virginicum *L.*
Iris versicolor *L.*
Ledum groenlandicum *Oeder*
Nemopanthes mucronata *(L.) Trel.*
Picea mariana *(Mill.) BSP.*
Rubus triflorus *Richards*
Vaccinium oxycoccos *L.*

NEW YORK SPECIES OF HYPHOLOMA

Hypholoma Fr.

Pileus more or less fleshy, the margin at first incurved; lamellae adnate or sinuate and adnexed; veil interwoven, adhering in fragments to the margin of the pileus, not forming a distinct membranous annulus on the stem; spores brown or purplish brown.

The appendiculate character of the margin of the young pileus is a distinguishing feature of the genus and is suggestive of its name. Many of the species grow on wood and are cespitose in their mode of growth. The spore color is brown or purplish brown, but in a few species the spore print on white paper is almost black. The genus corresponds in structure to the white spored genus Tricholoma, the pink spored Entoloma and the ochraceous spored

Hebeloma. Species with a luxuriant development of the veil must be carefully distinguished from Stropharia on one hand, and those with a scanty development of it, from Psilocybe on the other. The species are not in all cases sharply limited and connecting forms are not always satisfactorily located. They have been distributed in five sections, one of which, the Viscida, is yet unrepresented in our flora. The following synoptical key gives the distinguishing characters of the sections.

KEY TO THE SECTIONS

Pileus hygrophanous ..... Appendiculata
Pileus not hygrophanous 1
1 Pileus glabrous red or yellow its prevailing colors ..... Fascicularia
1 Pileus not wholly glabrous and with other prevailing colors 2
2 Pileus silky or floccose when young ..... Floccosa
2 Pileus hairy or fibrillose, brown or brownish ..... Velutina

Appendiculata

Pileus hygrophanous, glabrous when mature.

The species are commonly small, the pileus rarely exceeding two inches in diameter. They inhabit decaying wood or ground rich in humus and are gregarious or cespitose. The color of the pileus in some species is greatly changed by the escape of its moisture, in others but slightly. This may be regarded as a difficult section because of the variability of the species and their close resemblance to each other.

KEY TO THE SPECIES

Pileus at first whitish or yellowish ..... incertum
Pileus at first some other color 1
1 Young lamellae violaceous ..... candolleanum
1 Young lamellae not violaceous 2
2 Moisture of fresh pileus escaping first from the margin ..... madeodiscum
2 Moisture of fresh pileus escaping first from the center 3
3 Plants gregarious, terrestrial ..... hymenocephalum
3 Plants commonly cespitose and lignatile ..... appendiculatum

Hypholoma incertum Pk.

UNCERTAIN HYPHOLOMA

N. Y. State Mus. Rep't 29, p.40. Mus. Mem. 4, p.165, pl.60, fig.1–9

Pileus thin, fragile, ovate or subcampanulate becoming yellow, especially in the center, commonly white when dry, even or radiately wrinkled, the thin margin sometimes wavy or irregular and when young adorned with fragments of the white fugacious veil, flesh

white; lamellae thin, close, narrow, adnate, whitish then rosy brown, finally purplish brown; stem equal, hollow, easily splitting, white or whitish; spores 8–10 μ long, 4–6 μ broad.

Pileus 2–6 cm broad; stem 2.5–7 cm long, 2–6 mm thick.

Gregarious or sparingly cespitose in lawns, pastures, grassy and bushy places and by roadsides in showery weather. May to September. Common. Edible and of excellent flavor.

This species differs from the next following species in its paler young pileus, its adnate lamellae which also are not at first violaceous and in its stem which is not striate at the top. It differs also from the appendiculate hypholoma, Hypholoma appendiculatum (Bull.) Fr. by its paler pileus, its larger spores, its more gregarious habit and in its habitat. It occasionally has the pileus radiately and areolately rimose.

Hypholoma candolleanum Fr.

CANDOLLE HYPHOLOMA

Sylloge V, p.1038

Pileus fleshy but thin, convex or subcampanulate, becoming expanded, obtuse, glabrous, hygrophanous, bay when young and moist, white with a yellowish center when dry, flesh white; lamellae rounded behind, adnexed, close, at first violaceous, then cinnamon brown; stem fragile, subfibrillose, hollow, striate at the apex, white; spores 8–9 μ long, 4–5 μ broad.

Pileus 5–10 cm broad; stem 5–7 cm long, 3–6 mm thick.

Cespitose. Growing on the ground. Silver Springs, Wyoming co. August. Rare.

We have not seen young and fresh specimens of this plant and doubtfully admit it on the strength of specimens which, in this case as in others so referred, do not show young lamellae with a violaceous color, though in other respects they appear to belong to it. Even the figures of it given in Mycological Illustrations and in Illustrations of British Fungi do not show this color to the lamellae, though the description of the species requires it.

Hypholoma madeodiscum Pk.

MOIST DISK HYPHOLOMA

N. Y. State Mus. Rep't 38, p.88

Pileus thin, convex becoming nearly plane, hygrophanous, reddish brown when moist, grayish, tawny or ochraceous and rugose in the

center when dry, the moisture escaping first from the margin, slightly silky fibrillose on the margin when young; lamellae close, slightly sinuate, adnexed, whitish becoming brown or purplish brown; stem equal or siightly thickened at the base, hollow, slightly silky fibrillose, obscurely striate at the apex, white; spores 8–10 μ long, 5–6 μ broad.

Pileus 2.5–5 cm broad, stem 4–7 cm long, 4–6 mm thick.

Single or gregarious. Decaying wood. Adirondack mountains. June. Rare. Found but once.

Remarkable for the persistency of the moisture in the center of the pileus. This character is suggestive of the specific name and separates it from allied species. It has some points of agreement with the candolle hypholoma, Hypholoma candolleanum Fr., but differs from it in its mode of growth and in the color of the young lamellae.

Hypholoma hymenocephalum Pk.

THIN CAP HYPHOLOMA

N. Y. State Mus. Rep't 31, p.34

Pileus very thin and fragile, campanulate or convex becoming expanded, sometimes umbonate, hygrophanous, brown and striatulate when moist, pallid or whitish and radiately rugulose when dry, subatomate, the whitish appendiculate veil soon evanescent; lamellae thin, narrow, close, dingy white becoming purplish brown; stem slender, fragile, hollow, striate, slightly mealy at the top, white; spores 8 μ long, 4 μ broad.

Pileus 2.5–5 cm broad; stem 5–10 cm long, 2–3 mm thick.

Gregarious. Damp ground among fallen leaves, especially under shrubs or small trees. Occasional. July and August.

The species is remarkable for its very thin and fragile pileus and for its fragile striate stem. The margin of the pileus is sometimes deeply split, forming radiating lobes and giving a stellate appearance to the cap.

Hypholoma appendiculatum (Bull.) Fr.

APPENDICULATE HYPHOLOMA

Sylloge V, p.1039

Pileus thin, fleshy, ovoid or convex becoming expanded, glabrous, hygrophanous, bay brown or tawny brown when moist, ochraceous or pale ochraceous and rugose after the escape of the moisture;

lamellae close, narrow, adnate, whitish or creamy white becoming purplish brown; stem slender, equal, hollow, glabrous, pruinose at the top, white, the veil webby, white or whitish attached to the margin of the pileus when young, quickly disappearing; spores 5–7 μ long, 3–4 μ broad.

Pileus 2–6 cm broad; stem 5–7 cm long, 4–6 mm thick.

Densely cespitose. Decaying wood chiefly in woods of hilly or mountainous districts. August to October.

This name as used by Bulliard appears to have been applied to at least two species and on this account some confusion has resulted. In the Outlines of British Fungology, plate 11, figures 3 and 4, two species are evidently included under this name. In Sylloge V, page 1039, the name is limited to the species represented by figure 3. In our treatment of this species we have limited it to those specimens which best agree with the characters ascribed to it in Sylloge. The agreement is good except in the color of the gills, which in our specimens passes from whitish to purplish brown instead of incarnate brown. The peculiar characters of the species are its tendency to form dense tufts, to grow chiefly on decaying wood, to be very hygrophanous, the difference between the color of the moist cap and the dry being well marked, and in the lateness of its appearance. The dimensions of the spores are given in Sylloge as 6–8 x 3–4 μ, in British Fungus Flora as 5 x 2.5 μ. In our specimens they agree better with those given in Sylloge.

Fasciculares

Pileus tenacious, glabrous, bright colored, dry, not hygrophanous.

The flesh of the pileus in this section is thicker and more firm than in the species of the preceding one. The prevailing colors of the pileus are red and yellow and its surface is smooth and not at all hygrophanous. They usually grow in tufts on dead or decaying wood and appear in autumn. The species resemble each other closely and should be cautiously separated.

KEY TO THE SPECIES

Young stem stuffed ..... sublateritium
Young stem hollow 1
1 Prevailing color of the pileus red ..... perplexum
1 Prevailing color of the pileus yellow ..... capnoides

Hypholoma sublateritium (Schaeff.) Fr.

BRICK RED HYPHOLOMA

Sylloge V, p.1028

Pileus fleshy, convex or nearly plane, glabrous, obtuse, dry, dark brick red, often paler on the margin, flesh whitish or yellowish, taste commonly bitter, sometimes mild; lamellae close, adnate, whitish becoming sooty olivaceous or purplish brown; stem equal or tapering downward near the base, glabrous or slightly fibrillose, stuffed, sometimes becoming hollow when old, ferruginous; spores 6–8 μ long, 3–4 μ broad.

Pileus 2.5–7.5 cm broad; stem 5–9 cm long, 4–12 mm thick.

Commonly cespitose. On or about old stumps, prostrate trunks of trees and on decaying wood covered with earth. August to November. Common. Edible. Occasionally several stems grow from a common base.

Hypholoma sublateritium squamosum Cke. Pileus spotted with appressed darker scales, otherwise like the type. This variety is rare, having been found but once. Piseco, Hamilton co. August.

Hypholoma perplexum Pk.

PERPLEXING HYPHOLOMA

N. Y. State Cab. Rep't 23, p.99. Mus. Mem. 4, p.166, pl.60, fig.10–17

Pileus convex or nearly plane, sometimes umbonate, glabrous, reddish or brownish red, usually yellowish on the margin, flesh white or whitish, taste mild; lamellae thin, close, slightly rounded behind, adnexed, pale yellow becoming tinged with green, finally purplish brown; stem rather slender, equal or nearly so, firm, hollow, slightly fibrillose, whitish or yellowish above, reddish brown below; spores 6–8 μ long, 3–4 μ broad.

Pileus 2.5–7 cm broad; stem 5–7 cm long, 4–8 mm thick.

Generally cespitose. On or about stumps or prostrate trunks of trees in woods or open places. Common. August to November. Edible.

This is very closely related to the preceding species, its distinguishing features being its commonly smaller size, paler margin of the pileus, mild taste, paler and more slender stem which is always hollow, even when young. A small form of it has been found by F. C. Stewart growing from the base of cultivated red currants. This may indicate a parasitic tendency of it.

Hypholoma capnoides Fr.

FIR WOOD HYPHOLOMA

Sylloge V, p.1028

Pileus fleshy, convex or nearly plane, obtuse, glabrous, dry, yellowish, often reddish or ochraceous in the center, flesh white, odor and taste mild; lamellae moderately close, adnate, dry, smoky gray becoming purplish or brown; stem equal or nearly so, silky, striate at the top, sometimes curved or flexuous, hollow, pallid; spores 7–8 μ long, 4–5 μ broad.

Pileus 2.5–4 cm broad; stem 4–7 cm long, 4–6 mm thick.

Single or cespitose. On or about pine and spruce stumps or prostrate trunks. Adirondack mountains and Albany co. May to September. Rare.

The Friesian description ascribes only yellowish and ochraceous colors to the pileus of this species, but in our specimens the center of the pileus is often reddish or orange tinted. This color is also shown in the figures of the species as given in Icones, plate 133, and in Illustrations of British Fungi, plate 559. The mature lamellae of the typical form are described as purplish, but in our specimens they are brown with no apparent purplish tint. We have not thought it best to separate our plant on account of this slight deviation from the description of the color of the mature lamellae of the European form of the species.

Floccosa

Pileus silky or adorned when young with superficial floccose scales. This section at present is represented in our State by two species only.

KEY TO THE SPECIES

Pileus silky or fibrillosely spotted.....aggregatum
Pileus floccosely scaly.....fragile

Hypholoma aggregatum Pk.

AGGREGATED HYPHOLOMA

N. Y. State Mus. Ann. Rep't 46, p. 106; Botanist's ed. p. 26

Pileus thin, convex or subcampanulate, obscurely spotted by appressed brownish fibrils, grayish white, flesh white; lamellae subdistant, rounded behind, adnexed, whitish becoming brown or

blackish brown, whitish on the edge; stem long, slender, hollow, slightly floccose or fibrillose, white; spores 7–8 μ long, 4–5 μ broad.

Pileus 2–3 cm broad; stem 5–8 cm long, 3–4 mm thick.

Densely cespitose. Base of trees and stumps. Albany co. September. Rare.

The densely tufted mode of growth and the grayish white, obscurely spotted pileus are distinguishing features of this species. From Hypholoma silvestre Gill. it may be separated by its smaller size, densely tufted mode of growth and adnexed lamellae with no rosy tint. From Hypholoma storea Fr. it is distinguished by its hollow stem, adnexed lamellae and the absence of an umbo.

Hypholoma aggregatum sericeum Pk.

N. Y. State Mus. Bul. 54, p.972, pl.79, fig.8–14

This variety differs from the typical form in its pileus being silky and destitute of spots and in having its stem striate at the top.

Warren co. September. Rare. Edible.

The edibility of the typical form of the species has not been tested by myself, but according to McIlvaine the caps are fine.

Hypholoma fragile Pk.

FRAGILE HYPHOLOMA

N. Y. State Mus. Bul. 131, p.22, pl.V, fig.1–7

Pileus thin, fragile, conic or subcampanulate becoming convex, obtuse or subumbonate, floccosely squamulose when young, glabrous when mature, yellowish, grayish or subochraceous, sometimes more highly colored in the center, the thin margin at first appendiculate with fragments of the white veil; lamellae thin, narrow, close, adnate, whitish or pallid becoming purplish brown; stem slender, fragile, stuffed or hollow, glabrous or minutely floccose, white or pallid; spores 8–10 μ long, 4–5 μ broad.

Pileus 1.2–2.4 cm broad; stem 2.5–5 cm long, 2–3 mm thick.

Gregarious. Decayed wood and among fallen leaves in damp places in woods. Starlake, St Lawrence co. Painted Post, Steuben co. August. Not common.

A small, delicate and fragile species. The specimens from Star lake are smaller and more highly colored than the others, but do not seem worthy of separation. The dried specimens bear some resemblance to Hypholoma incertum Pk., but the ab-

sence of the hygrophanous character of the pileus, its smaller size and more fragile nature and its different habitat lead me to keep it separate.

Velutina

Pileus silky or streaked with innate fibrils, sometimes glabrous.

The characters of this section, as given in Sylloge, would strictly admit only species having a silky or fibrillose pileus, but inasmuch as species like Hypholoma atrichum Berk. and H. castanophyllum Berk., of which the pileus is described as glabrous, have been admitted to it, we have extended the definition to include glabrous species which in other respects belong here. The species of the section generally have the color of the spores darker than in the preceding sections. Therefore the color of the mature lamellae is almost or quite black and the spore print on white paper appears black or nearly so. On this account the species are liable at first sight to be referred to the black spored series. The shape and size of the spores are in some cases important characters in distinguishing closely related species.

KEY TO THE SPECIES

Pileus persistently hairy squamose or fibrillose....1
Pileus partly or wholly glabrous....2
1 Plant cespitose, spores 8–10 x 5–6 μ....lacrymabundum
1 Plant gregarious, spores 10–12 x 6–8 μ....rigidipes
2 Pileus even, the cuticle often rimose....boughtoni
2 Pileus rugose or radiately wrinkled....3
3 Pileus tawny, spores rough....rugocephalum
3 Pileus brown, spores smooth....delineatum

Hypholoma lacrymabundum Fr.

WEEPING HYPHOLOMA

Sylloge V, p.1033

Pileus fleshy, convex, obtuse, persistently squamose with dark brown or blackish hairy tufts, not hygrophanous, often irregular from its crowded tufted mode of growth, brown or tawny brown, flesh whitish; lamellae moderately close, adnate or subsinuate, whitish becoming purplish brown, almost black when fully mature, whitish on the edge, often beaded with tearlike drops of moisture in damp weather; stem equal or nearly so, fibrillose or squamose, hollow, whitish, pallid or brownish; spores purplish brown, 8–10 μ long, 5–6 μ broad.

Pileus 5–8 cm broad; stem 5–8 cm long, 5–8 mm thick.

Single or cespitose. On or about old stumps. Albany co. August to October. Not common.

The ornamentation of the pileus is variable. The hairlike fibrils are sometimes elongated and appressed, sometimes collected in tufts. They are often black and occasionally coarse and strigose, specially on the margin.

Hypholoma rigidipes Pk.

RIGID STEM HYPHOLOMA

N. Y. State Mus. Bul. 139, p.24, pl.III, fig.1–6

Pileus fleshy, thin, convex or broadly convex, dry, fibrillose squamulose, tawny brown, often reddish in the center, flesh whitish, taste mild; lamellae close, narrow, slightly sinuate, adnexed, brownish red becoming dark purplish brown or black; stem slender, rigid, equal, hollow, fibrillose squamulose, colored like or little paler than the pileus; spores broadly ellipsoid, apiculate, 10–12 μ long, 6–8 μ broad.

Pileus 2.5–5 cm broad; stem 5–10 cm long, 4–6 mm thick.

Gregarious. Damp places among tall herbs. North River, Warren co. September. Rare.

This species is well marked by its gregarious mode of growth. In the ornamentation of the pileus it is related to the preceding species, but it differs in its mode of growth, smaller size, more slender rigid stem and larger apiculate spores.

Hypholoma boughtoni Pk.

BOUGHTON HYPHOLOMA

N. Y. State Mus. Bul. 139, p.23, pl.II, fig.1–7

Pileus fleshy, thin except in the center, broadly convex or subhemispheric, rarely with an umbo, glabrous or slightly fibrillose, often concentrically or areolately cracking, pale reddish brown or grayish brown, flesh whitish, taste disagreeable; lamellae moderately close, adnate, purplish brown, seal brown or blackish, obscurely spotted, whitish on the edge; stem equal, floccosely fibrillose, striate at the top, hollow, white or whitish; spores broadly and unequally ellipsoid, apiculate, black on white paper, 10–12 μ long, 7–8 μ broad.

Pileus 2.5–7 cm broad; stem 2.5–6 cm long, 4–10 mm thick.

Ground in woods or open places. Albany, Monroe, New York and Tompkins counties. August and September.

Hypholoma rugocephalum Atk.

RUGOSE HYPHOLOMA

Mushrooms, Edible and Poisonous, 2d ed., p.30, pl.8, fig.29

Pileus fleshy in the center, convex becoming expanded, broadly umbonate, glabrous, irregularly wrinkled or rugose, tawny, the thin margin often curved upward, flesh tinged with yellow; lamellae thin, slightly sinuate, adnate, easily seceding from the stem, spotted, purplish black when mature; stem even, irregular, fleshy, hollow, glabrous, subbulbous, colored like the pileus, paler above the slight filamentous often spore-blackened remnants of the annulus; spores oval or broadly ellipsoid, inequilateral, pointed at each end, echinulate or minutely tuberculate, 8–11 μ long, 6–8 μ broad, black; cystidia cylindric, slightly enlarged at the top, hyaline, clustered.

Pileus 6–10 cm broad; stem 7–10 cm long, 6–10 mm thick.

Single or cespitose. Damp places in woods. July and August. Tompkins and Suffolk counties.

This is related to the preceding species from which it may be separated by its wholly glabrous tawny pileus and its rugosely wrinkled continuous cuticle. Both are allied to Hypholoma velutinum (Pers.) Fr., but may be distinguished from it by the absence of the hygrophanous character and by their broader spores.

Hypholoma delineatum n. sp.

DELINEATED HYPHOLOMA

Pileus fleshy, thin, convex or nearly plane, often slightly depressed in the center, glabrous, rugose or radiately wrinkled, commonly marked toward and on the margin even when dry with irregular radiating lines or ridges, occasionally wavy or irregular on the margin, brown, tawny brown or reddish brown, often darker in the center, flesh whitish; lamellae thin, close, adnate, brown becoming blackish brown; stem equal, glabrous, hollow, pallid or colored like the pileus; spores even, ellipsoid, not apiculate, 8–10 μ long, 4–6 μ broad; cystidia scarce, 40–60 μ long, 16–20 μ broad.

Pileus 2.5–5 cm broad; stem 3–5 cm long, 3–6 mm thick.

Gregarious. Ground and decayed wood. Port Jefferson, Suffolk co. August. Rare.

This species is likely to be easily mistaken for the preceding one, Hypholoma rugocephalum Atk., which it re-

sembles externally but from which it is separated by its more narrow obtuse and smooth spores and by its broader flask-shaped cystidia. Its glabrous rugosely and radiately wrinkled pileus separate it from H. velutinum (Pers.) Fr. The pileus also having neither spots nor regular striations distinguishes it from H. lepidotum Bres. Specimens of it have been received from Eglon, West Virginia, and from Rockville, Indiana.

Pileus carnosus, tenuis, convexus vel subplanus, in centro aliquando leviter depressus, glaber, rugosus vel radiate rugosus, in siccitate margine striis irregularibus radiantibus ornatus, aliquando margine irregularis, brunneus fulvo-brunneus vel rufo-brunneus, frequenter in centro nigrescens, carne albida; lamellae tenues, confertae, adnatae, aliquando leviter sinuatae, brunneae deinde nigro-brunneae; stipes aequalis, glaber, cavus, pallidus vel pileo in colore similis; sporae laeves, ellipsoideae, 8–10 x 4–6 μ; cystidia 40–60 x 16–20 μ.

Several species formerly referred to this genus have been omitted because of erroneous determination or because they are more closely related to the genus Psilocybe.

NEW YORK SPECIES OF PSATHYRA

Psathyra Fr.

Pileus membranaceous, conic or campanulate, fragile, hygrophanous, the margin at first straight and appressed to the stem; mature lamellae brown or purplish brown; stem subcartilaginous, fragile, polished, hollow; veil none or only universal and floccose fibrillose.

The genus may be separated from Psilocybe by the fragile character of the pileus and stem and by the straight appressed margin of the young pileus. It is divided into three sections, Conopileae, Obtusatae and Fibrillosae. Of the first section no representative has yet been found within our limits.

Obtusatae

Pileus campanulate or convex, glabrous or atomate; lamellae plane or arcuate; veil none.

KEY TO THE SPECIES

Pileus growing on decaying wood ..... conica
Pileus growing on ground among hair cap mosses ..... polytrichophila

Psathyra conica Pk.

CONIC PSATHYRA

N. Y. State Mus. Rep't 54, v. 1; report of the State Botanist p.153, pl.H, fig.17–22

Pileus thin, conic, rarely convex, glabrous, hygrophanous, dark brown when moist, pale ochraceous when dry; lamellae very broad, close, adnate, whitish or pallid when young, dark brown when mature, often white crenulate on the edge; stem slender, hollow, silky fibrillose, brown; spores 5–6 μ long, 3–4 μ broad.

Pileus 8–12 mm broad; stem 2–4 cm long, 1 mm thick.

Decaying prostrate trunks of spruce. Franklin co. September. Rare.

Psathyra polytrichophila Pk.

MOSS-LOVING PSATHYRA

N. Y. State Mus. Rep't 30, p. 42

Pileus thin, convex or subcampanulate, glabrous, fragile, sometimes with a slight umbo, hygrophanous, brown and striatulate on the margin when moist, pale ochraceous or buff color when dry, subshining; lamellae plane, adnate or slightly arcuate and subdecurrent, broad, subdistant, purplish brown; stem slender, equal, stuffed with a whitish pith, mealy at the top, slightly fibrillose toward the base, colored like the pileus; spores purplish brown, 8 μ long, 5 μ broad.

Pileus 4–10 mm broad; stem 2.5–5 cm long, 1–2 mm thick.

Gregarious. Ground among hair cap mosses, Polytrichum. Albany and Oneida counties. May. Rare.

Fibrillosae

Pileus and stem at first floccose or fibrillose from the universal veil.

KEY TO THE SPECIES

Pileus umbonate ..... umbonata
Pileus obtuse ..... vestita

Psathyra umbonata Pk.

UMBONATE PSATHYRA

N. Y. State Mus. Rep't 50 1:106

Pileus submembranous, campanulate, strongly umbonate, hygrophanous, purplish brown and striatulate when moist, grayish white when dry, even or slightly rugulose, atomate, often radiately sul-

cate and slightly fibrillose on the margin, the umbo usually becoming paler than the rest; lamellae broad, subdistant, ventricose, subadnate, brownish red becoming purplish brown, finally almost black; stem slender, flexuose, hollow, white, commonly hairy tomentose at the base and slightly mealy at the top; spores blackish brown or almost black, 12–16 μ long, 6–8 μ broad.

Pileus 2–3 cm broad; stem 4–7 cm long, 1.5–2 mm thick.

Gregarious or subcespitose. On chip dirt and vegetable mold. Hamilton co. July. Rare.

It is closely related to Psathyra corrugis (Pers.) Fr. from which it may be separated by its much darker colored and striatulate moist pileus, atomate and with a white umbo when dry, less glabrous and more slender stem and broader spores. The umbo is very prominent and loses its moisture before the rest of the pileus. In consequence it becomes very conspicuous, appearing like a white knob in the midst of a dark background. Because of the fibrils on the margin of the pileus it is placed in this section though the fibrils are not always present. In the dried specimens the margin is sulcate striate.

Psathyra vestita Pk.

CLOTHED PSATHYRA

N. Y. State Mus. Bul. 105, p.28

Pileus submembranaceous, ovate, conic or subcampanulate, obtuse, at first covered with white flocculent fibrils, reddish becoming pallid or white and silky fibrillose, sometimes slightly striate on the margin when moist, striate to the center when dry; lamellae thin, narrow, close, adnate, white when young, becoming blackish brown; stem equal, hollow, flexuous, floccose fibrillose becoming silky fibrillose, mealy and often striate at the top, white; spores purplish brown, 8–10 μ long, 5–6 μ broad.

Pileus 8–16 mm broad; stem 2.5–4 cm long, 2–3 mm thick.

Gregarious. Among fallen leaves and grass. Essex co. September.

This species is closely related to Psathyra semivestita B. & Br. from which it differs in color and in being wholly clothed when young with white floccose fibrils.

EXPLANATION OF PLATES

Plate 121

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Boletus albus Pk.

WHITE BOLETUS

1 Young plant
2 Mature plant
3 Vertical section of upper part of a young plant
4 Vertical section of upper part of a mature plant
5 Four spores x 400

Lycoperdon atropurpureum Vitt.

PURPLE SPORED PUFF BALL

6 Two young plants
7 A mature plant
8 Vertical section of a fully grown plant while yet in edible condition
9 Vertical section of a fully mature plant
10 Four spores x 400

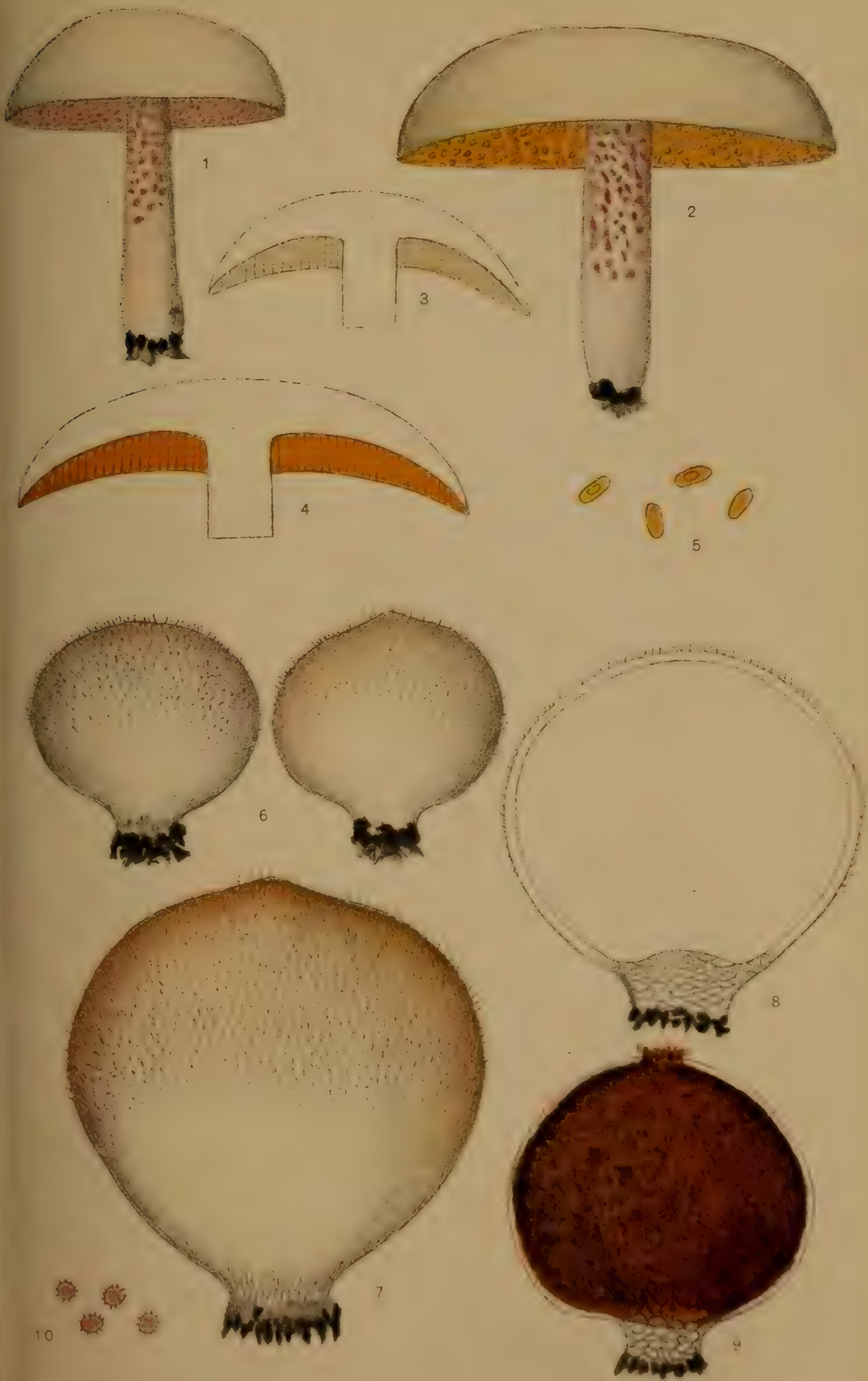

FIG. 1-5
BOLETUS ALBUS PK.
WHITE BOLETUS

FIG. 6-10
LYCOPERDON ATROPURPUREUM VITT.
PURPLE SPORED PUFF BALL

Plate 122

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Lactarius camphoratus Fr.

FRAGRANT LACTARIUS

1 Young plant
2 Mature plant showing hymenium
3 Mature plant showing umbonate pileus
4–5 Vertical section of upper part of two plants
6 Transverse section of stem
7 Four spores x 400

Cantharellus aurantiacus Fr.

ORANGE CHANTARELLE

8 Young plant
9 Mature plant
10 Mature plant with brown center of pileus
11 Mature plant with gills paler than usual
12 Mature plant with white pileus and pale gills
13–14 Vertical section of upper part of two plants showing variation in color of gills
15 Diagrammatic representation of forking of the gills
16 Four spores x 400

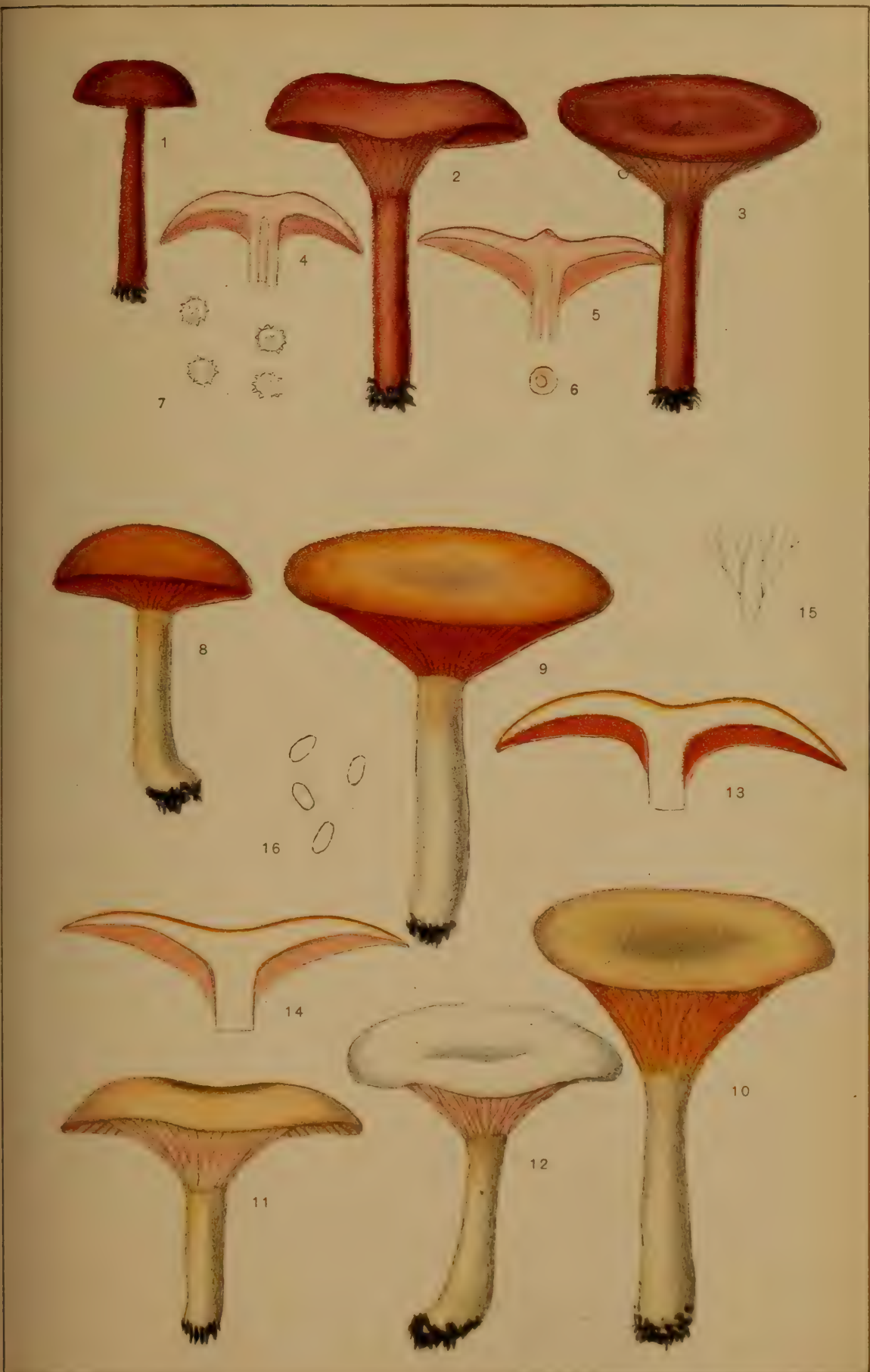

FIG. 1-7
LACTARIUS CAMPHORATUS FR.
CAMPHORY LACTARIUS

FIG. 8-16
CANTHARELLUS AURANTIACUS FR.
ORANGE CHANTARELLE

Plate 123

Lactarius lignyotus Fr.

SOOTY LACTARIUS

1 Young plant
2 Plant of medium size showing crenate and striate margin of cap
3 Large plant with fully expanded cap showing a small umbo and irregular radiating ridges; also discolored wound of gills and drop of milk issuing from it
4 Vertical section of upper part of a young plant
5 Vertical section of upper part of a mature plant
6 Four spores x 400

LACTARIUS LIGNYOTUS Fr.

SOOTY LACTARIUS

Plate IV

Lactarius boughtoni Pk.

BOUGHTON LACTARIUS

1 Young plant
2 Middle-aged plant
3 Mature plant
4 Vertical section of upper part of a young plant
5 Vertical section of upper part of a mature plant
6 Transverse section of a stem
7 Four spores x 400

LACTARIUS BOUGHTONI Pk.

BOUGHTON LACTARIUS

Plate VI

Cortinarius croceofolius Pk.

SAFFRON-GILLED CORTINARIUS

1 Young plant
2 Middle-aged plant
3–4 Mature plants
5 Vertical section of upper part of a young plant
6 Vertical section of upper part of a mature plant
7 Transverse section of a stem
8 Four spores x 400

Clitocybe biformis Pk.

TWO-FORMED CLITOCYBE

9 Young plant
10 Middle-aged plant
11 Mature plant showing more highly colored cap and gills
12 Mature plant with eccentric stem
13 Vertical section of upper part of a middle-aged plant
14 Vertical section of upper part of a mature plant with eccentric stem
15 Four spores x 400

FIG. 1-8
ORTINARIUS CROCEOFOLIUS PK.
SAFFRON GILLED CORTINARIUS

FIG. 9-15
CLITOCYBE BIFORMIS PK.
TWO FORMED CLITOCYBE

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New York State Education Department

New York State Museum

JOHN M. CLARKE, Director

PUBLICATIONS

Packages will be sent prepaid except when distance or weight renders the same impracticable. On 10 or more copies of any one publication 20% discount will be given. Editions printed are only large enough to meet special claims and probable sales. When the sale copies are exhausted, the price for the few reserve copies is advanced to that charged by second-hand booksellers, in order to limit their distribution to cases of special need. Such prices are inclosed in [ ]. All publications are in paper covers, unless binding is specified. Checks or money orders should be addressed and payable to New York State Education Department.

Museum annual reports 1847–date. *All in print to* 1894, 50c *a volume*, 75c *in cloth; 1894–date, sold in sets only;* 75c *each for octavo volumes; price of quarto volumes on application.*

These reports are made up of the reports of the Director, Geologist, Paleontologist, Botanist and Entomologist, and museum bulletins and memoirs, issued as advance sections of the reports.

Director's annual reports 1904–date.

1904.	138p. 20c.	1908.	234p. 39pl. map. 40c.	
1905.	102p. 23pl. 30c.	1909.	230p. 41pl. 2 maps, 4 charts.	*Out of print.*
1906.	186p. 41pl. 35c.	1910.	280p. il. 42pl. 50c.	
1907.	212p. 63pl. 50c.			

These reports cover the reports of the State Geologist and of the State Paleontologist. Bound also with the museum reports of which they form a part.

Geologist's annual reports 1881–date. Rep'ts 1, 3–13, 17–date, 8vo; 2, 14–16, 4to.

In 1898 the paleontologic work of the State was made distinct from the geologic and was reported separately from 1899–1903. The two departments were reunited in 1904, and are now reported in the Director's report.

The annual reports of the original Natural History Survey, 1837–41, are out of print.

Reports 1–4, 1881–84, were published only in separate form. Of the 5th report 4 pages were reprinted in the 39th museum report, and a supplement to the 6th report was included in the 40th museum report. The 7th and subsequent reports are included in the 41st and following museum reports, except that certain lithographic plates in the 11th report (1891) and 13th (1893) are omitted from the 45th and 47th museum reports.

Separate volumes of the following only are available.

Report	*Price*	*Report*	*Price*	*Report*	*Price*
12 (1892)	$.50	17	$.75	21	$.40
14	.75	18	.75	22	.40
15, 2v.	2	19	.40	23	.45
16	1	20	.50	[*See* Director's annual reports]	

Paleontologist's annual reports 1899–date.

See first note under Geologist's annual reports.

Bound also with museum reports of which they form a part. Reports for 1899 and 1900 may be had for 20c each. Those for 1901–3 were issued as bulletins. In 1904 combined with the Director's report.

Entomologist's annual reports on the injurious and other insects of the State of New York 1882–date.

Reports 3–20 bound also with museum reports 40–46, 48–58 of which they form a part. Since 1898 these reports have been issued as bulletins. Reports 3–4, 17 are out of print, other reports with prices are:

Report	Price	Report	Price	Report	Price
1	$.50	11	$.25	19 (Bul. 76)	$.15
2	.30	12	.25	20 (" 97)	.40
5	.25	13	*Free*	21 (" 104)	.25
6	.15	14 (Bul. 23)	.20	22 (" 110)	.25
7	.20	15 (" 31)	.15	23 (" 124)	.75
8	.25	16 (" 36)	.25	24 (" 134)	.35
9	.25	18 (" 64)	.20	25 (" 141)	.35
10	.35			26 (" 147)	.35

Reports 2, 8–12 may also be obtained bound in cloth at 25c each in addition to the price given above.

Botanist's annual reports 1867–date.

Bound also with museum reports 21–date of which they form a part; the first Botanist's report appeared in the 21st museum report and is numbered 21. Reports 21–24, 29, 31–41 were not published separately.

Separate reports for 1871–74, 1876, 1888–98 are out of print. Report for 1899 may be had for 20c; 1900 for 50c. Since 1901 these reports have been issued as bulletins.

Descriptions and illustrations of edible, poisonous and unwholesome fungi of New York have also been published in volumes 1 and 3 of the 48th (1894) museum report and in volume 1 of the 49th (1895), 51st (1897), 52d (1898), 54th (1900), 55th (1901), in volume 4 of the 56th (1902), in volume 2 of the 57th (1903), in volume 4 of the 58th (1904), in volume 2 of the 59th (1905), in volume 1 of the 60th (1906), in volume 2 of the 61st (1907), 62d (1908), 63d (1909) reports. The descriptions and illustrations of edible and unwholesome species contained in the 49th, 51st and 52d reports have been revised and rearranged, and, combined with others more recently prepared, constitute Museum Memoir 4.

Museum bulletins 1887–date. 8vo. *To advance subscribers,* $2 *a year or* $1 *a year for division* (1) *geology, economic geology, paleontology, mineralogy;* 50c *each for division* (2) *general zoology, archeology, miscellaneous,* (3) *botany,* (4) *entomology.*

Bulletins are grouped in the list on the following pages according to divisions.

The divisions to which bulletins belong are as follows:

1 Zoology	51 Zoology	101 Paleontology
2 Botany	52 Paleontology	102 Economic Geology
3 Economic Geology	53 Entomology	103 Entomology
4 Mineralogy	54 Botany	104 "
5 Entomology	55 Archeology	105 Botany
6 "	56 Geology	106 Geology
7 Economic Geology	57 Entomology	107 "
8 Botany	58 Mineralogy	108 Archeology
9 Zoology	59 Entomology	109 Entomology
10 Economic Geology	60 Zoology	110 "
11 "	61 Economic Geology	111 Geology
12 "	62 Miscellaneous	112 Economic Geology
13 Entomology	63 Paleontology	113 Archeology
14 Geology	64 Entomology	114 Paleontology
15 Economic Geology	65 Paleontology	115 Geology
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—— & Simpson, George B. v. 6 Corals and Bryozoa of the Lower and Upper Helderberg and Hamilton Groups. 24 + 298p. 67pl. 1887. $2.50.
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—— & Clarke, John M. v. 8 pt 1 Introduction to the Study of the Genera of the Paleozoic Brachiopoda. 16 + 367p. 44pl. 1892. $2.50.
—— & Clarke, John M. v. 8 pt 2 Paleozoic Brachiopoda. 16 + 394p. 64pl. 1894. $2.50.

Catalogue of the Cabinet of Natural History of the State of New York and of the Historical and Antiquarian Collection annexed thereto. 242p. 8vo. 1853.

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Geologic maps. Merrill, F. J. H. Economic and Geologic Map of the State of New York; issued as part of Museum bulletin 15 and 48th Museum report, v. 1. 59 x 67 cm. 1894. Scale 14 miles to 1 inch. 15c.

—— Map of the State of New York Showing the Location of Quarries of Stone Used for Building and Road Metal. Mus. Bul. 17. 1897. Free.
—— Map of the State of New York Showing the Distribution of the Rocks Most Useful for Road Metal. Mus. Bul. 17. 1897. Free.
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Part of Clinton county. State Geol. Rep't 19. 1901.
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Education Department Bulletin

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New York State Museum

JOHN M. CLARKE, Director

Museum Bulletin 151

THE MINING AND QUARRY INDUSTRY OF NEW YORK STATE

REPORT OF OPERATIONS AND PRODUCTION DURING 1910

BY

D. H. NEWLAND

ALBANY

UNIVERSITY OF THE STATE OF NEW YORK

1911

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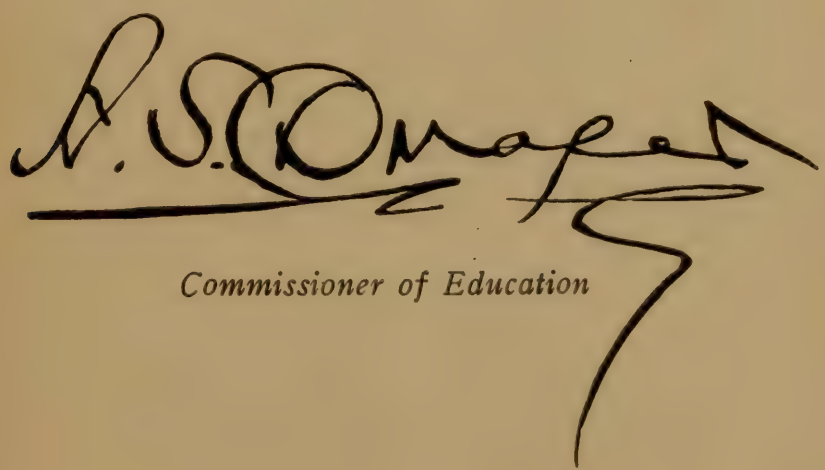
MY DEAR SIR:

I transmit to you herewith the manuscript of our annual report on *The Mining and Quarry Industry of New York State,* for the year 1910, and I recommend its publication as a bulletin of the State Museum.

Very respectfully
JOHN M. CLARKE
Director

STATE OF NEW YORK
EDUCATION DEPARTMENT
COMMISSIONER'S ROOM

Approved for publication this 17th day of June 1911



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Museum Bulletin 151

THE MINING AND QUARRY INDUSTRY

OF

NEW YORK STATE

REPORT OF OPERATIONS AND PRODUCTION DURING 1910

BY

D. H. NEWLAND

INTRODUCTION

The year 1910 did not witness any notable extension of mining and quarry operations in the State. The outlook at the opening seemed propitious for a very busy season for these industries and a substantial advance in most branches, but the activity of the first few months was not maintained. Toward the middle of the year a reaction set in which soon caused general curtailment of production and put a definite end to further progress. In this respect the industrial record was exactly the reverse of that for 1909 when the depression which lasted during the first few months gave way to a period of marked expansion and prosperity.

A summary of the reports rendered by the mining and quarry enterprises shows that the value of the mineral production of the State amounted to $35,400,257. The total represents a slight gain

as compared with the value of $34,742,287 for the output in the preceding year, but it falls considerably short of the high mark reached in 1907 when a production of over $37,000,000 was reported.

The figures as given are based on some thirty different materials in their crude or first marketable forms, but can not be considered as representing the full importance which the mineral industries share in the activities of the State. They are serviceable, however, as standards for comparing the conditions in these fundamental branches so closely allied with many other businesses of chemical, metallurgical or engineering nature. The manufacture of pig iron by local furnaces is alone nearly equal to the totals given for the entire output of the mines and quarries.

One of the few mineral products that showed a decided gain during the year was iron ore, of which the gross output amounted to 1,517,880 long tons. This is probably the largest quantity that has ever been hoisted from the New York mines. After allowance for concentration there remained suitable for furnace use a total of 1,159,067 tons of ore which had a value of $3,906,478. The corresponding figures for 1909 were 991,008 tons valued at $3,179,358. The Adirondack region furnished, as usual, the greater part of the product, but the mines in the Clinton belt of central and western New York were more active than for some time. Altogether there were thirteen companies who reported a production, as compared with twelve in 1909 and ten in 1908.

The clay-working industries contributed an important share of the total value with an aggregate of $11,518,982 for the various materials which were manufactured. In comparison with the record for 1909 this showed a slight decrease, for which the dull season in the building trades was mainly responsible. The output of clay structural materials, such as brick, terra cotta, tile and fire proofing, was valued at $8,067,098 against $9,342,015 in 1909, a decline of nearly 15 per cent. The number of brick for building purposes made last year was 1,404,345 thousands against 1,518,023 thousands in 1909, of which the plants in the Hudson river region contributed about three-fourths. On the other hand the value of the pottery manufacturers showed a good gain with a total of $2;136,518 against $1,827,193 in the preceding year. The number of plants engaged in the different branches of clay manufacturing was 223, or nine less than 1909.

The value of the quarry materials last year was $6,193,252, also a loss as compared with the record for 1909 when the sum of $7,061,580 was reported. The total was divided according to various uses into: building stone, $780,333; monumental stone, $101,673; curb and flagstone, $484,020; crushed stone, $3,042,136; other uses, $1,785,090. The output of slate, millstones, and limestone used in making hydraulic cement is not included in these totals. All kinds of stone were quarried less extensively last year, though the falling off was particularly noticeable in granite and sandstone which are used largely for structural purposes. The production of limestone, marble and trap was but little smaller than in the preceding year.

Conditions in the hydraulic cement trade were rather unfavorable last year, yet there was a notable gain in production from the local mills. The total quantity of cement manufactured was 3,657,015 barrels valued at $3,087,020, against 2,610,383 barrels valued at $2,122,902 in 1909. The gain came from the portland cement plants which contributed a total of 3,364,255 barrels as compared with 2,061,019 barrels in the preceding year; the production of natural cement continued to decline, as for a number of years past, and amounted only to 292,760 barrels, or about one-half the quantity reported for 1909. The latter industry, once so important in the State, has thus been reduced to small proportions, but there is every prospect of a continued growth of the portland branch in which some large developments have recently been in progress.

The production of salt from the mines and wells of the State amounted to 10,270,273 barrels, exceeding that of any previous year. The value of the output was $2,258,292. As compared with the totals reported for 1909 there was a gain of about 4 per cent in quantity, but a slight reduction in the value of the product. The two rock salt mines were very active and served to keep Livingston county, in which they are situated, in the leading place as a salt producer. Onondaga county had the second largest industry, though it contributed very little for actual sale, most of its output being consumed locally for alkali manufacture.

The mining of gypsum has assumed large proportions of late years due to the increased manufacture of gypsum plasters for building purposes. The output from the mines last year reached a total of 465,591 short tons as compared with 378,232 short tons for 1909. The value of the different gypsum materials, including wall plaster, plaster of paris, and gypsum sold in unburned condition, was $1,122,952, against $907,601 in the preceding year. The gain

which exceeded 20 per cent came mostly from the mines in the western section where a number of new enterprises recently entered the field.

The combined value of the petroleum and natural gas produced in the State last year was $2,869,893 against $3,059,308 in 1909. The quantity of petroleum, all from the wells in Allegany, Cattaraugus and Steuben counties, amounted to 1,073,650 barrels with a value of $1,458,194. This was a reduction from the previous year's total of 1,160,128 barrels attributable to the recent drop in prices which discouraged exploration work. The gas wells, however, made a larger output than ever before, the total flow amounting approximately to 4,815,643,000 cubic feet with a value of $1,411,699 against 3,825,215,000 cubic feet and a value of $1,045,693 in 1909. The Erie county wells contributed the largest increase of output for the year.

The talc industry is one of the smaller mining activities represented in New York and the output came mostly from a single district in St Lawrence county. The amount obtained last year was about 65,000 short tons, valued at $552,500, a gain of 15,000 tons over the total for 1909. The St Lawrence county mines have practically a monoply of the fibrous talc consumed in paper manufacture.

Garnet for abrasive uses was produced to the amount of 5297 short tons, valued at $151,700, a large gain over the figures reported for the preceding year which were 3802 tons, valued at $119,190.

The production of crystalline graphite from the Adirondack mines amounted to 2,619,000 pounds with a value of $160,700. The corresponding total for 1909 was 2,342,000 pounds with a value of $140,140.

The mineral springs that were used for commercial purposes reported sales of 8,432,672 gallons valued at $675,034 as compared with 9,019,490 gallons valued at $857,342 in 1909.

Among the other mineral materials which had a place in the list of products reported last year were apatite, carbon dioxid, clay, diatomaceous earth, emery, feldspar, lead ore, marl, millstones, metallic paint, slate pigment, pyrite, quartz, slate, sand and sand-lime brick. The collected value of these materials was $2,904,454 as compared with $2,170,881 in 1909.

Mineral production of New York in 1906

PRODUCT	UNIT OF MEASUREMENT	QUANTITY	VALUE
Portland cement	Barrels	2 423 374	$2 766 488
Natural rock cement	Barrels	1 691 565	1 184 211
Building brick	Thousands	1 600 059	9 688 289
Pottery	.....	.....	1 795 008
Other clay products	.....	.....	2 472 003
Crude clay	Short tons	5 477	9 125
Emery	Short tons	1 307	13 870
Feldspar and quartz	Long tons	13 660	44 350
Garnet	Short tons	4 729	159 298
Glass sand	Short tons	9 000	8 600
Graphite	Pounds	2 811 582	96 084
Gypsum	Short tons	262 486	699 455
Iron ore	Long tons	905 367	3 393 609
Millstones	.....	.....	22 442
Metallic paint	Short tons	2 714	29 140
Slate pigment	Short tons	2 045	15 960
Mineral waters	Gallons	8 000 000	1 000 000
Natural gas	1000 cubic feet	3 007 086	766 579
Petroleum	Barrels	1 043 088	1 721 095
Pyrite	Long tons	11 798	35 550
Salt	Barrels	9 013 993	2 131 650
Roofing slate	Squares	16 248	57 771
Slate manufactures	.....	.....	4 150
Sand-lime brick	Thousands	17 080	122 340
Granite	.....	.....	255 189
Limestone	.....	.....	2 963 829
Marble	.....	.....	460 915
Sandstone	.....	.....	1 976 829
Trap	.....	.....	847 403
Talc	Short tons	64 200	541 600
Other materials [1]	.....	.....	1 850 000
Total value	.....	.....	$37 132 832

[1] Includes apatite, arsenical ore, carbon dioxid, diatomaceous earth, fullers earth, marl and sand and gravel exclusive of glass sand.

Mineral production of New York in 1907

PRODUCT	UNIT OF MEASUREMENT	QUANTITY	VALUE
Portland cement	Barrels	2 108 450	$2 214 090
Natural rock cement	Barrels	1 137 279	757 730
Building brick	Thousands	1 366 842	7 424 294
Pottery	.....	.....	2 240 895
Other clay products	.....	.....	3 023 679
Crude clay	Short tons	3 927	6 163
Emery	Short tons	1 223	13 057
Feldspar and quartz	Long tons	8 723	36 230
Garnet	Short tons	5 709	174 800
Glass sand	Short tons	1 200	1 380
Graphite	Pounds	2 950 000	106 951
Gypsum	Short tons	323 323	751 556
Iron ore	Long tons	1 018 013	3 750 493
Millstones	.....	.....	21 806
Metallic paint	Short tons	5 269	59 521
Slate pigment	Short tons	620	3 700
Mineral waters	Gallons	8 000 000	1 000 000
Natural gas	1000 cubic feet	3 052 145	800 014
Petroleum	Barrels	1 052 324	1 736 335
Pyrite	Long tons	49 978	162 430
Salt	Barrels	9 657 543	2 449 178
Roofing slate	Squares	11 686	53 625
Slate manufactures	.....	.....	1 175
Sand-lime brick	Thousands	16 610	109 677
Granite	.....	.....	195 900
Limestone	.....	.....	3 182 447
Marble	.....	.....	1 571 936
Sandstone	.....	.....	1 998 417
Trap	.....	.....	941 627
Talc	Short tons	59 000	501 500
Other materials [1]	.....	.....	1 850 000
Total value	.....	.....	$37 141 006

[1] Includes apatite, arsenical ore, carbon dioxid, diatomaceous earth, fullers earth, marl and sand and gravel exclusive of glass sand.

Mineral production of New York in 1908

PRODUCT	UNIT OF MEASUREMENT	QUANTITY	VALUE
Portland cement	Barrels	1 988 874	$1 813 622
Natural rock cement	Barrels	623 588	441 136
Building brick	Thousands	1 066 533	5 200 951
Pottery	.....	.....	1 653 241
Other clay products	.....	.....	2 064 671
Crude clay	Short tons	4 697	11 605
Emery	Short tons	690	8 860
Feldspar and quartz	Short tons	16 413	68 148
Garnet	Short tons	2 480	79 890
Graphite	Pounds	1 932 000	116 100
Gypsum	Short tons	318 046	760 759
Iron ore	Long tons	697 473	2 098 247
Millstones	.....	.....	18 341
Metallic paint	Short tons	5 750	54 500
Slate pigment	Short tons	922	7 376
Mineral waters	Gallons	8 007 092	877 648
Natural gas	1000 cubic feet	3 860 000	987 775
Petroleum	Barrels	1 160 128	2 071 533
Pyrite	Long tons	23 775	104 798
Salt	Barrels	9 005 311	2 136 736
Sand and gravel	.....	.....	1 130 291
Sand-lime brick	Thousands	8 239	55 688
Slate	.....	.....	111 217
Granite	.....	.....	367 564
Limestone	.....	.....	3 119 835
Marble	.....	.....	692 857
Sandstone	.....	.....	1 711 585
Trap	.....	.....	723 773
Talc	Short tons	70 739	697 390
Other materials [1]	.....	.....	333 648
Total value	.....	.....	$29 519 785

[1] Includes apatite, carbon dioxid, diatomaceous earth and marl.

Mineral production of New York in 1909

PRODUCT	UNIT OF MEASUREMENT	QUANTITY	VALUE
Portland cement	Barrels	2 061 019	$1 761 297
Natural rock cement	Barrels	549 364	361 605
Building brick	Thousands	1 518 023	8 159 096
Pottery	.....	.....	1 827 193
Other clay products	.....	.....	2 365 193
Crude clay	Short tons	12 174	11 585
Emery	Short tons	892	10 780
Feldspar and quartz	Short tons	16 111	52 444
Garnet	Short tons	3 802	119 190
Graphite	Pounds	2 342 000	140 140
Gypsum	Short tons	378 232	907 601
Iron ore	Long tons	991 008	3 179 358
Millstones	.....	.....	15 000
Metallic paint	Short tons	6 560	65 600
Slate pigment	Short tons	1 155	9 130
Mineral waters	Gallons	9 019 490	857 342
Natural gas	1000 cubic feet	3 825 215	1 045 693
Petroleum	Barrels	1 160 402	1 914 663
Salt	Barrels	9 880 618	2 298 652
Molding sand	Short tons	468 609	437 402
Sand-lime brick	Thousands	12 683	81 693
Roofing slate	Squares	21 187	126 170
Slate manufactures	.....	.....	880
Granite	.....	.....	479 955
Limestone	.....	.....	3 300 383
Marble	.....	.....	380 016
Sandstone	.....	.....	1 839 798
Trap	.....	.....	1 061 428
Talc	Short tons	50 000	450 000
Other materials [1]	.....	.....	1 483 000
Total value	.....	.....	$34 742 287

[1] Includes apatite, carbon dioxid, diatomaceous earth, marl, pyrite, and sand and gravel exclusive of molding sand.

Mineral production of New York in 1910

PRODUCT	UNIT OF MEASUREMENT	QUANTITY	VALUE
Portland cement	Barrels	3 364 255	$2 938 818
Natural rock cement	Barrels	292 760	147 202
Building brick	Thousands	1 404 345	6 683 071
Pottery	.....	.....	2 136 518
Other clay products	.....	.....	2 699 393
Crude clay	Short tons	6 005	9 667
Emery	Short tons	978	11 736
Feldspar and quartz	Short tons	18 012	64 503
Garnet	Short tons	5 297	151 700
Graphite	Pounds	2 619 000	160 700
Gypsum	Short tons	465 591	1 122 952
Iron ore	Long tons	1 159 067	3 906 478
Millstones	.....	.....	6 613
Metallic paint	Short tons	8 063	70 841
Slate pigment	Short tons	1 400	10 900
Mineral waters	Gallons	8 432 672	675 034
Natural gas	1000 cubic feet	4 815 643	1 411 699
Petroleum	Barrels	1 073 650	1 458 194
Pyrite	Long tons	37 270	175 791
Salt	Barrels	10 270 273	2 258 292
Sand and gravel	.....	.....	2 129 708
Sand-lime brick	Thousands	14 053	82 619
Roofing slate	Squares	14 107	79 857
Slate manufactures	.....	.....	3 233
Granite	.....	.....	244 763
Limestone	.....	.....	3 245 807
Marble	.....	.....	341 880
Sandstone	.....	.....	1 451 796
Trap	.....	.....	909 006
Talc	Short tons	65 000	552 500
Other materials [1]	.....	.....	258 986
Total value	.....	.....	$35 400 257

[1] Includes apatite, carbon dioxid, diatomaceous earth, marl and lead ore.

CEMENT

The portland cement mills of the State generally reported a larger business during 1910 than for some time past. The year as a whole, however, could hardly be called very favorable for the industry. The improved demand which began late in 1909 enabled manufacturers to extend operations, in some plants to nearly full capacity, but prices were still on an unremunerative basis. A radical improvement in this respect was especially needed to bring any real prosperity to the industry. A slight advance that was

made early in the summer appeared to mark the beginning of a stronger market, but before the year closed prices were again on the former level. That the consumption of cement has been increasing should strengthen the hope for a definite relief of the market situation before long. With the large amount of engineering work in progress in the State, the local producers have fared perhaps better than the average.

The unfavorable conditions were still more accentuated in the natural cement trade, in which both prices and demand showed a marked decline. For the last decade the natural cement companies have been gradually withdrawing from business and the production has fallen to small proportions. The closing of the plants has caused heavy losses not only of capital but of industrial activity to many communities, since only in one or two instances has it been possible to replace the enterprises with portland cement mills. As a measure of the former importance of the natural cement industry in New York, the statistics in the accompanying table will be of interest.

The aggregate production of cement in 1910 amounted to 3,657,015 barrels. The total for the preceding year was 2,610,383 barrels and for 1908 it was 2,612,462 barrels. The production last year has not been exceeded since 1906. The returns showed that twelve companies were active, or one less than in 1909, and about one-half the number active five years ago.

Of the total production, the portland cement mills contributed 3,364,255 barrels, with a value of $2,939,818, much the largest that has ever been reported. In the preceding year the output was 2,061,019 barrels valued at $1,761,297. One new plant was placed in operation and eight in all were active during the whole or part of the year.

The output of natural cement was returned as 292,760 barrels, valued at $147,202, against 549,364 barrels valued at $361,605 in 1909. There were only four companies which reported a production, a loss of three as compared with the preceding year. The Rosendale district was represented by a single company and Onondaga county by three firms. All of the plants in Erie county were closed throughout the year.

Production of cement in New York

YEAR	PORTLAND CEMENT		NATURAL CEMENT	
	Barrels	Value	Barrels	Value
1890	65 000	$140 000	3 776 756	$2 985 513
1891	87 000	190 250	3 931 306	3 046 279
1892	124 000	279 000	3 780 687	3 074 781
1893	137 096	287 725	3 597 758	2 805 387
1894	117 275	205 231	3 446 330	1 974 463
1895	159 320	278 810	3 939 727	2 285 094
1896	260 787	443 175	4 181 918	2 423 891
1897	394 398	690 179	4 259 186	2 123 771
1898	554 358	970 126	4 157 917	2 065 658
1899	472 386	708 579	4 689 167	2 813 500
1900	465 832	582 290	3 409 085	2 045 451
1901	617 228	617 228	2 234 131	1 117 066
1902	1 156 807	1 521 553	3 577 340	2 135 036
1903	1 602 946	2 031 310	2 417 137	1 510 529
1904	1 377 302	1 245 778	1 881 630	1 207 883
1905	2 117 822	2 046 864	2 257 698	1 590 689
1906	2 423 374	2 766 488	1 691 565	1 184 211
1907	2 108 450	2 214 090	1 137 279	757 730
1908	1 988 874	1 813 622	623 588	441 136
1909	2 061 019	1 761 297	549 364	361 605
1910	3 364 255	2 939 818	292 760	147 202

The New York-New England Cement and Lime Co. started its new portland cement mill during the summer. The quarries and kilns are situated at Greenport near Hudson. The company also uses the old plant of the Hudson Cement Co. at the river side as a supplementary mill, the two plants being connected by a private railroad. The capacity of the works is the largest of any in the State.

The Knickerbocker Portland Cement Co. is expected to begin operations this summer. The limestone quarries which are already opened are situated on Becraft mountain in the same vicinity as those of the former company, in the Coeymans and Manlius formations. The plant is designed for a capacity of 3000 barrels a day and will include three rotary kilns, each 10 by 175 feet. Shipping facilities into New England states are provided by the Boston & Albany Railroad, and the company has a private road connecting with the main line of the New York Central and with the Hudson river.

The Marengo Portland Cement Co., the successor to the Iroquois Co., completed the work of remodeling the mill at Caledonia, Livingston county, which was again placed in operation. The mill of the Wayland Portland Cement Co., at Wayland, Steuben county, also resumed work.

The mill of the Empire Portland Cement Co., at Warners, Onondaga county, was dismantled and sold. The company will not continue in the business.

A second new producer during the current year will probably be the mill now under construction at Jamesville, Onondaga county, by Thomas Millen & Co. It is expected to be ready for operation in July.

CLAY

The prominence of the clay-working industries in New York State is due chiefly to the widely distributed deposits of common clays suited for building brick, drain tile and materials of that class. As the whole State lies within the zone of Pleistocene glaciation, residual clays are of rare occurrence and of little commercial importance.

Most of the clays that are utilized are modified glacial deposits. They are commonly of blue color, weathering to yellow at the surface, and contain rather high percentages of iron and fluxing ingredients. Extensive deposits occur in the Hudson and Champlain valleys where they form terraces at different elevations from near water level to several hundred feet above, and also in some of the larger valleys in the interior of the State. These clays generally burn at a relatively low temperature to a red color.

Deposits of white burning and refractory clays are restricted to Long island and Staten island. They belong to the Cretaceous and occur as scattered, but in some places heavy, beds. They are adapted for fire brick, stoneware, terra cotta and the better grades of building brick.

In addition to the soft clays there is an abundance of shales among the stratified rock formations; some of the shales are adapted for making paving and building brick, tile and other materials, though they have not been exploited to any extent.

PRODUCTION OF CLAY MATERIALS

Details of the production of clay materials in New York State during the last two or three years are given in the accompanying tables which are based on reports from practically every manufacturer in the several branches of the industry.

The returns received for the year 1910 show that trade conditions as a whole were rather unsatisfactory, though the outlook at the opening seemed propitious for a busy and prosperous season. As a matter of fact business fell off steadily from month to month, its course being exactly opposite to the trend of the preceding year. In the building trades, which had shown marked activity in the later months of 1909, the decline was most pronounced and the demand for all classes of clay structural materials was very restricted. The Hudson river brick industry experienced the full effects of the depression, production having largely exceeded the demand, with poor prospects for any material improvement in the situation during the current season.

Production of clay materials

MATERIAL	1908	1909	1910
Common brick	$5 064 194	$8 009 766	$6 563 212
Front brick	136 757	149 330	119 859
Vitrified paving brick	211 289	207 970	333 511
Fire brick and stove lining	545 951	486 894	464 693
Drain tile	273 134	268 589	254 679
Sewer pipe	133 716	117 324	127 731
Terra cotta	709 360	962 497	1 062 017
Fireproofing	91 377	166 025	256 820
Building tile	70 162	54 397	65 190
Miscellaneous	29 680	101 497	134 752
Pottery	1 653 241	1 827 193	2 136 518
Total	$8 918 861	$12 351 482	$11 518 982

The output of clay materials of all kinds in 1910 was valued at $11,518,982. The total thus fell only a little short of that for the preceding year when the value was $12,351,482, but for many branches the showing was really much less favorable than this comparison would indicate. The number of firms or individuals engaged in the clay-working industry was 223 against 232 in 1909 and the product was distributed among 39 of the 61 counties in the State.

Examination of the different items entering into the production brings out the fact that the main decrease was in building brick, the output of which was valued at $6,683,071 against $8,159,096

in 1909, a decrease of $1,476,025. Common brick accounted for $6,563,212 in the total, against $8,009,766 in the preceding year, and front brick for $119,859 against $149,330. Fire brick and stove lining showed a small decrease, with a total value of $464,693 against $486,894 in 1909. The vitrified paving brick industry, on the other hand, reported a good advance, the product reaching a value of $333,511 as compared with $207,970 for the preceding year. The manufacture of drain tile was valued at $254,679 against $268,589; and of sewer pipe at $127,731 against $117,324. The production of terra cotta was valued at $1,062,017 as compared with $962,497 in 1909; fireproofing at $256,820, as compared with $166,025; and building tile at $65,190 as compared with $54,397. The miscellaneous clay manufactures, including such items as flue lining, fire tile and shapes, conduit pipes and acid-proof brick, had a collected value of $134,752 against $101,497 in 1909. The potteries of the State reported an output valued at $2,136,518 as compared with a value of $1,827,193 in the preceding year.

A distribution of the production in 1910 according to the counties represented places Ulster county in the lead as having the largest clay-working industry. The value of its output was $1,121,460, nearly $500,000 less than the total for 1909. Rockland county held second place, with a value of $1,080,117, also showing a large reduction from the amount reported in the preceding year. In both counties the manufacture of common building brick is the main industry. Erie county advanced from sixth place in 1909 to third place last year with an aggregate value of $841,726. It has a diversified industry, including important potteries. Onondaga county maintained its place as the fourth largest producer and contributed a value of $833,892, practically the same as in 1909. The other counties which reported a value exceeding $500,000 were, in order: Orange ($761,500); Dutchess ($649,862); Albany ($641,227); Richmond ($633,010); Kings ($569,720); Queens ($551,375); and Schenectady ($505,966).

Production of clay materials by counties

COUNTY	1908	1909	1910
Albany	$538 213	$750 754	$641 227
Allegany	44 627	22 601	*a*
Cattaraugus	*a*	*a*	63 887
Cayuga	13 280	15 400	20 675
Chautauqua	128 866	118 897	129 331
Chemung	89 000	61 000	*a*
Clinton	3 920	*a*	*a*
Columbia	283 720	472 280	454 550
Dutchess	605 371	880 707	649 862
Erie	632 048	753 362	841 726
Greene	113 373	346 982	266 452
Jefferson	17 897	11 175	7 997
Kings	416 474	490 946	569 720
Livingston	53 555	6 900	*a*
Madison	12 550	*a*	nil
Monroe	240 087	278 991	264 421
Nassau	71 390	136 375	111 650
Niagara	10 892	22 923	22 882
Oneida	88 606	83 500	126 907
Onondaga	734 880	834 111	833 892
Ontario	214 246	196 345	269 549
Orange	747 637	814 440	761 500
Queens	*a*	435 182	551 375
Rensselaer	233 995	317 559	348 172
Richmond	587 919	698 991	633 010
Rockland	800 603	1 488 457	1 080 117
Saratoga	245 878	335 670	388 428
Schenectady	238 750	322 549	505 966
Steuben	166 544	205 036	219 615
Suffolk	125 430	68 370	101 560
Ulster	819 947	1 620 468	1 121 460
Washington	11 295	10 950	3 685
Westchester	226 062	438 243	371 328
Other counties *b*	401 808	112 318	158 038
Total	$8 918 863	$12 351 482	$11 518 982

a Included under "Other counties."
b In 1908, aside from counties marked *a* are included Broome, Fulton, Genesee, Herkimer, Montgomery, New York, St Lawrence, Tioga, Tompkins, Warren, and Wayne counties. In 1909, aside from counties marked *a* are included Fulton, Genesee, Montgomery, New York, St Lawrence, Tioga, Tompkins, Warren, and Wayne counties. In 1910, aside from counties marked *a* are included Genesee, Montgomery, New York, St Lawrence, Tompkins, and Warren counties.

MANUFACTURE OF BUILDING BRICK

The product of common building brick in 1910 amounted to 1,396,606,000, against 1,507,126,000 in the preceding year, showing a decrease of 110,520,000. The value of the product was $6,563,212 against $8,009,766, or a decrease of $1,446,554. In addition there were made last year 7,739,000 front brick valued at $119,859, as compared with 10,897,000 valued at $149,330 in the preceding year. The aggregate output of brick for building purposes was,

therefore, 1,404,345,000 valued at $6,683,071, against 1,518,023,000 valued at $8,159,096 in 1909. The manufacture of building brick was carried on in 32 counties by a total of 172 companies or individuals. In 1909 there were 36 counties represented with a total of 180 producers. The largest number of producers for any one year was in 1906 when 213 reported as active, distributed over 37 counties.

The average price received for common brick throughout the State was $4.70 a thousand, the price being based on the sales at the yard. This was the lowest average reported in a number of years. In 1909 the corresponding figure was $5.31 a thousand and in 1908 when the effects of the panic were still strongly felt the average was $4.79 a thousand. The maximum average of late years was $6.53 in 1905. The price of front brick averaged $15.49 a thousand last year against $13.70 in 1909 and $14 in 1908.

Production of common building brick

COUNTY	1909		1910	
	NUMBER	VALUE	NUMBER	VALUE
Albany	80 343 000	$429 554	74 496 000	$390 894
Cattaraugus	.....	.....	612 000	5 984
Cayuga	1 612 000	10 200	2 403 000	16 075
Chautauqua	7 815 000	52 047	5 058 000	32 588
Chemung	10 500 000	61 000	*b*.....	*b*.....
Clinton	250 000	1 500	*b*.....	*b*.....
Columbia	88 026 000	472 280	92 700 000	454 550
Dutchess	170 615 000	876 207	147 696 000	649 862
Erie	43 379 000	243 786	51 244 000	283 207
Greene	42 794 000	246 982	30 374 000	137 452
Jefferson	1 450 000	11 175	1 068 000	7 997
Livingston	1 100 000	6 700	312 000	2 184
Monroe	23 493 000	126 950	19 531 000	111 758
Nassau	20 000 000	118 560	17 000 000	107 500
Niagara	3 368 000	22 923	3 434 000	22 882
Oneida	16 000 000	83 500	19 126 000	119 082
Onondaga	22 800 000	154 250	19 569 000	104 534
Ontario	2 350 000	14 200	*b*.....	*b*.....
Orange	164 680 000	814 440	160 500 000	761 500
Rensselaer	19 895 000	102 225	14 600 000	72 800
Richmond	37 500 000	170 475	32 355 000	134 049
Rockland	275 262 000	1 488 457	251 190 000	1 080 117
Saratoga	70 539 000	333 728	84 639 000	387 268
Steuben	3 480 000	30 132	*b*.....	*b*.....
Suffolk	11 870 000	68 370	16 360 000	98 560
Ulster	304 904 000	1 620 468	263 873 000	1 121 460
Westchester	72 265 000	392 577	66 836 000	332 027
Other counties *a*	10 836 000	57 080	21 630 000	128 882
Total	1 507 126 000	$8 009 766	1 396 606 000	$6 563 212

a Includes in 1909, Allegany, Cattaraugus, Fulton, Montgomery, St Lawrence, Tioga, Tompkins, Warren, and Washington counties. In 1910 the following counties are included: Chemung, Clinton, Montgomery, Ontario, St Lawrence, Steuben, Tompkins, Warren, and Washington.
b Included under "Other counties."

Hudson river region. The Hudson river region from Albany and Rensselaer counties south to New York city enjoys special advantages in the manufacture and marketing of building brick and has long held a leading position in that branch of the industry. The nine counties included in the region contribute about four-fifths of the entire output of common brick in the State. A small share of the product, mainly from the yards in Albany and Rensselaer counties, is marketed locally; the rest is all shipped to New York, mostly by river during the eight or nine months of open navigation.

The occurrence and character of the clays are very similar throughout the region. They form banks or terraces, with occasional layers of sand or gravel, and are normally blue in color, weathering to yellow near the surface. They are worked by open pit excavation. In one or two places the clay is obtained by dredging from the river. They usually contain rather high percentages of fluxing constituents, chiefly calcium carbonate, and sufficient iron to burn to a red color. The brick are molded by the soft-mud process and burned in scove kilns. The run of the kilns is classed as "Hudson common hard."

With a single grade of product, practically all shipped to one market, it is natural that the industry should be subject to sudden and extensive fluctuations. The normal productive capacity of the region may be placed at about 1,200,000,000 a year, which is above the average annual consumption. During the years 1905 and 1906, a period of exceptional prosperity, the demand equaled or slightly exceeded that figure and prices were on a very remunerative basis. This brought about an expansion of operations so that in 1907 the market became overstocked: as a result the production fell the following year to about 800,000,000 and prices ruled very low. The improved conditions during 1909 brought the production up to the earlier level and restored prices to a fairly profitable basis, but the activity was only temporary. The course of the market during the past season was steadily downward, reaching in the later months a stage below that of any recent year.

The status of the industry in 1909 and 1910 is shown by the accompanying tables which give the production, value, average price, and number of active plants separately for each county. The total number of brick manufactured last year was 1,102,265,000, valued at $5,000,662, reported by 114 plants. In the preceding year the number was 1,218,784,000, valued at $6,443,190, with 117 active plants. Though the decline of output thus amounted to less than

10 per cent, there is no doubt that a much larger proportion of the product remained unsold at the close of 1910 than at the end of 1909. It is estimated that the stocks in the yards at the close of the past season amounted to fully 350,000,000 or nearly one-third of the year's output. About 200,000,000 are estimated as having been carried over from 1909. The actual consumption for the year can be placed accordingly at about 950,000,000.

The average price realized for the brick at the yard last year was $4.54 a thousand. This was the lowest average in any recent year and represented a decrease of $.74 from the average for 1909. The prices ranged from about $5 in the early months of 1910 to below $4 during the late fall and winter. As a whole the season was an unprofitable one for the manufacturer. Operations, no doubt, will be curtailed during the current year.

New York prices on the average are about $1.25 a thousand above the prices at the yard. The difference represents the cost of river shipment and commission exacted on the sale of the brick by the New York dealers.

The leading county in the industry is Ulster, which contributed a production last year of 263,873,000, valued at $1,121,460 against 304,904,000 valued at $1,620,468 in 1909. Rockland county is second and Orange third, the latter displacing Dutchess county which ranked third in the list in 1909.

Output of common brick in the Hudson river region in 1909

COUNTY	NUMBER OF PLANTS	OUTPUT	VALUE	AVERAGE PRICE PER M
Albany	12	80 343 000	$429 554	$5 34
Columbia	5	88 026 000	472 280	5 36
Dutchess	19	170 615 000	876 207	5 13
Greene	5	42 794 000	246 982	5 77
Orange	8	164 680 000	814 440	4 93
Rensselaer	6	19 895 000	102 225	5 64
Rockland	28	275 262 000	1 488 457	5 40
Ulster	26	304 904 000	1 620 468	5 31
Westchester	8	72 265 000	392 577	5 43
Total	117	1 218 784 000	$6 443 190	$5 28

Output of common brick in the Hudson river region in 1910

COUNTY	NUMBER OF PLANTS	OUTPUT	VALUE	AVERAGE PRICE PER M
Albany	12	74 496 000	$390 894	$5 24
Columbia	6	92 700 000	454 550	4 90
Dutchess	19	147 696 000	649 862	4 40
Greene	5	30 374 000	137 452	4 52
Orange	8	160 500 000	761 500	4 74
Rensselaer	4	14 600 000	72 800	4 98
Rockland	28	251 190 000	1 080 117	4 30
Ulster	24	263 873 000	1 121 460	4 25
Westchester	8	66 836 000	332 027	4 96
Total	114	1 102 265 000	$5 000 662	$4 54

OTHER CLAY MATERIALS

The manufacture of vitrified paving brick was carried on by four companies in Cattaraugus, Chautauqua, Greene and Steuben counties, as against three companies in 1909. The number of paving brick made was 19,762,000 valued at $333,511 against 12,778,000 valued at $207,970 in 1909. The price received for paving brick averaged $16.88 a thousand, as compared with $16.27 in the preceding year.

The production of fire brick and stove lining showed a small decrease for the year, the total value for both products having been $464,693 against $486,894 in 1909. Fire brick numbered 9,596,000 valued at $380,980. The stove lining was valued at $83,713. The respective values reported in 1909 were $411,796 and $75,098. There were eleven companies operative, the same as in the preceding year. One company in Richmond county uses local clay, while the others obtain their crude material from outside the State, chiefly from New Jersey.

The output of drain tile and sewer pipe has varied little from year to year. In 1909 the manufacture of drain tile was carried on by eighteen firms who reported a production valued at $254,679. The same number of firms returned a value of $268,589 in the preceding year. Albany county outranked all others in this branch. The production of sewer pipe was valued at $127,731, as against $117,324 in 1909. Monroe county contributed the larger part.

Fireproofing, including terra cotta lumber, hollow brick, and various other kinds of hollow fireproofing, was made last year by

eight firms, one each in Albany, Erie, Kings, Monroe, New York, Oneida, Onondaga, and Rensselaer counties. The value of the output was $256,820 as compared with $166,025 in the preceding year when six firms reported as active. The use of clay fireproofing is growing very rapidly, and with the extensive markets to be found in the State and bordering territory, the local industry should develop to large proportions. Clays suitable for fireproofing are found in various sections.

Building tile, inclusive of roofing tile, vitrified floor tile and terra cotta tile, was reported from Allegany, Erie, Kings, Monroe and Oneida counties, by a total of six firms. The output was valued at $65,190 against $54,397 in 1909. This is another department of clay-working which deserves greater attention than it has received in the past.

Architectural or ornamental terra cotta showed a good gain, with a reported value of $1,062,017 against $962,497 in 1909. Its manufacture is carried on by three firms in Queens, Richmond and Steuben counties. The Staten island Cretaceous clays are used in part for this product.

The miscellaneous clay materials accounted for a value of $134,752 against $101,497 in 1909.

POTTERY

New York State is deficient in clays suitable for the finer grades of pottery such as china and porcelain ware. The clay beds of Long island, Staten island and Onondaga county have supplied some stoneware clays, and slip clay of excellent quality is obtained at Albany. Common earthenware clays also are abundant. There are no commercial deposits of kaolin, so far as known, and the entire requirements of this material are met by purchases from southern mines or by importations from abroad.

Notwithstanding the limitations of resources, the pottery industry has shown a fairly steady growth. The output last year was valued at $2,136,518 and was the largest that has ever been recorded. The gain over the preceding year exceeded $300,000. The number of potteries that contributed to the total was twenty-two, of which all but one reported their production. Porcelain and semiporcelain wares constituted the largest items in the total, with a value of $1,027,249. Electric and sanitary wares, which are classed together so as to conceal the individual figures, contributed $991,131 to the total. The value of the electric supplies does not include the metal

trimmings. The other pottery products of the State potteries embraced stoneware, earthenware, clay tobacco pipes and art pottery.

The following counties were represented in the production: Albany, Erie, Kings, Nassau, New York, Onondaga, Ontario, Queens, Schenectady, Suffolk, and Washington. Onondaga county ranked first in value of its output, with a total of $721,451, followed by Schenectady, Erie and Kings counties. Most of the china tableware was made in Syracuse and Buffalo; the electrical supplies were made in Victor, Lima, Syracuse, Schenectady and Brooklyn; and the sanitary wares in Brooklyn.

Value of production of pottery

WARE	1908	1909	1910
Stoneware	$44 712	$41 298	$41 925
Red earthenware	31 645	32 800	25 713
Porcelain and semiporcelain [1]	900 548	999 663	1 027 249
Electric and sanitary supplies	595 247	697 573	991 131
Miscellaneous	81 089	55 859	50 500
Total	$1 653 241	$1 827 193	$2 136 518

[1] Includes china tableware and cream-colored ware.

CRUDE CLAY

The clay obtained in a few localities is not utilized by the original producer, but is shipped to others for manufacture, some of it going to points without the State. This production, therefore, is listed separately from that of clay materials. The clay most extensively exploited for shipment is the Albany slip clay which is found in layers within the ordinary brick clays of the Hudson valley. It resembles the latter in appearance but has a finer grain and a larger percentage of the alkaline constituents than the usual run of the deposits. It has consequently a low fusibility and when applied to clay wares as a " slip " gives a rich brown glaze.

The light-colored refractory clays of Long island and Staten island and various pottery clays are also shipped to some extent.

Returns were received from five producers in 1910 and their total shipments of crude clay amounted to 6005 short tons, valued at $9667. In the preceding year the reported shipments amounted to 12,174 short tons valued at $11,585. The relatively higher value assigned to the product last year is explained by the larger proportion of slip clay in the total.

EMERY

The mining of emery has been carried on for a number of years near Peekskill, Westchester county, one of the few places in this country where the material is known to occur in quantity. The industry is small, as the native emery does not find so wide a market as the Grecian and Turkish product which can be imported at a low cost. The increasing use of artificial abrasives, also, has probably restricted the output of late years.

The Peekskill emery is a mixture of corundum, spinel and magnetite chiefly, though the mineral composition is rather variable. The corundum, which of course is the most valuable abrasive constituent, may constitute as much as 50 per cent of the entire rock and in the typical material is often seen in the form of large porphyritic crystals scattered through a fine-grained mass of magnetite and spinel. The rock is dense and hard, of dark gray to nearly black color, sometimes mottled by the lighter color of the corundum. It occurs as lenticular and banded masses within local intrusions of basic gabbroic rocks which are known as the Cortlandt series. The emery masses are believed to represent segregations of the heavier minerals of the gabbros while the latter were in a molten condition, a process similar to that which led to the formation of the titaniferous magnetites in the anorthosites and gabbros of the Adirondacks. Some of the deposits in Westchester county contain a fairly high percentage of magnetite and were once mined for iron ore, but owing to the high alumina content proved too refractory for furnace use.

Reports from the industry for the last year showed a product amounting to 978 short tons with a value of $11,736. The output was a little larger than in 1909 when a total of 892 short tons valued at $10,780 was reported and considerably more than in 1908, but still did not reach the level of some of the earlier years.

The figures of production are based upon shipments, and the value upon the crude rock without any treatment other than sorting or cobbing which it receives at the mines. None of the product is sold locally, but is shipped for grinding and preparation to abrasive manufacturers outside of the State. The producers in 1910 were as follows: Blue Corundum Mining Co., Easton, Pa.; Keystone Emery Mills, Frankford, Pa.; and the Tanite Co., Stroudsburg, Pa. The Hampden Corundum Wheel Co. of Springfield, Mass. and R. Lancaster of Peekskill who were engaged in the industry at one time did not make any shipments last year.

FELDSPAR

New York is a small producer of feldspar for uses in the manufacture of pottery, roofing material, and for other purposes. The industry, though long established in the State, has not developed to any extent, specially with regard to the production of the higher grades of feldspar suitable for pottery uses, which is insufficient to meet the local demand. Most of that material required by the New York potteries is brought in from Maine and other states or from Canada. Many quarries that have been opened in the Adirondacks and in the southeastern section have succumbed to competition owing to poor facilities for shipment or to unfavorable natural conditions.

The greater part of the present output consists of roofing feldspar, which is simply a crushed pegmatite made up usually of quartz, mica and other minerals in addition to the feldspar. This is produced in the Adirondack region by the Barrett Manufacturing Co. and the Crown Point Spar Co. which have quarries and crushing plants near Ticonderoga and Crown Point respectively. Pottery feldspar is produced by P. H. Kinkel's Sons who operate quarries near Bedford, Westchester county, and by the Adirondack Spar Co. with quarries near Batchellerville, Saratoga county. The Bedford quarries have yielded the greater quantity of pottery material that has been produced in the State. In addition to feldspar from the latter quarries there is also a considerable production of quartz which is utilized for wood filler.

No new discoveries or developments in connection with the feldspar industry were reported last year. The production was somewhat under the total for the preceding year and amounted to 12,132 short tons valued at $46,863. In 1909 it was 13,871 short tons with a value of $46,444, and in 1908 it was reported as 14,613 short tons with a value of $53,148. The market prices have remained about the same; crushed feldspar for roofing purposes averaged about $3 a ton last year and the ground spar about $6 a ton.

GARNET

The production of abrasive garnet during 1910 was 5207 short tons valued at $151,700. This represented a large gain over the output in the preceding year which was reported at 3802 tons valued at $119,190. It can not be said, however, that the increase reflected any real expansion of the mining industry through new develop-

ments or the entrance of new companies into the field; on the other hand the enlarged operations were but a response to an improved market situation after a period of severe depression. In 1907 the production of the mines amounted to 5709 tons or over 400 tons in excess of the total last year. In 1908 when the depression was severest, it fell to 2480 tons, less than one-half the output of an average year.

The year was unmarked by any notable changes in the industry. Most of the output as heretofore, came from the vicinity of North River in the upper Hudson valley. The North River Garnet Co., with mines on Thirteenth lake, Warren county, and H. H. Barton & Son Co., owning mines on Gore mountain a few miles southeast of the former locality, were the principal producers. The American Glue Co. has worked a property near North River in previous years, but did not make any output in 1910. Aside from the above the only mines recently operated were those of the Warren County Garnet Mills at Riparius, Warren county, and the American Garnet Co. on Mt Bigelow, near Keeseville, Essex county.

The market for abrasive garnet is limited and it has shown little tendency to grow, at least of late years. The Adirondack region furnishes almost the entire product that is mined in this country; attempts have been made to develop the industry in other states but do not appear to have been permanently successful. The present position of the local mines has been secured solely through advantages of economic production and marketing, as there is no monopoly of the natural resources. It would appear, however, that garnet of the requisite character for abrasive purposes occurs in but few regions in sufficient abundance to be worked on a commercial basis.

The value of abrasive garnet depends, of course, primarily upon its hardness. This is a variable character and on the usual mineral scale garnet is classed as having hardness of from 6.5 to 7.5. The limits as given are only approximate, as it is difficult and even impossible to estimate hardness with precision. Chemical composition is undoubtedly a factor in determining the hardness; of the common kinds of garnet found in the metamorphosed rocks, like gneisses, schists and limestones, the iron-alumina variety (almandite) is generally harder than the lime-alumina (grossularite) or the lime-iron variety (andradite). Well-crystallized garnet is tougher and probably also harder than granular or massive garnet of similar composition. The property of toughness or tenacity is very important in an abrasive which has to withstand considerable

pressure as when used on polishing machines. Another factor that has a bearing upon the value of abrasive garnet is the size of the product which can be secured in the ordinary practice of mining and separation. If the crystals are small or have been badly shattered or granulated by compression after crystallization the product may be too fine in the average to yield the necessary assortment of sizes. It is an advantage, rather than otherwise, however, that the garnet should possess an imperfect cleavage, so that on crushing the grains show one or more smooth surfaces. These surfaces permit firm attachment to the cloth or paper and also provide a sharp cutting edge. Color is no criterion of quality in ordinary garnet, but abrasive users seem to prefer the darker shades of red which approach the distinctive garnet color.

In the last few years Spanish garnet has been sold in the American market in competition with the domestic product. The garnet is said to be obtained from alluvial sands. It is produced at a lower cost than the Adirondack garnet and pays no import duty. It comes only in the finer sizes so that its use is somewhat limited. The imports in 1910 amounted to about 775 short tons with an invoiced value of $14,830. The imports in 1909 were 536 tons valued at $10,315. The principal ports of entry are New York, Boston and Chicago and the shipments are generally made through English ports.

GRAPHITE

An output of 2,619,000 pounds of crystalline graphite was reported last year from the Adirondack region. This was a substantial gain over the total of 2,342,000 pounds reported for 1909, but represented only an average output for the industry which has been subject to rather extensive fluctuations. The maximum product for any one year was in 1905 when it amounted to 3,897,616 pounds; a sharp decline during the next few years brought the total down to 1,932,000 pounds in 1908, since which time the industry has partly recovered its place.

The Adirondack graphite continues to find a good market. The returns from the mining companies show for last year's product a value of $160,700, or slightly more than 6 cents a pound. This does not represent the actual selling price, but rather a base or average for the mine output which is marketed under many different grades of widely varying value.

There have been few new features in the industry during the last year or two. In fact less interest has been manifest in exploration

for graphite and development of new properties than for some time, no doubt a natural reaction from the widespread attention which the industry shared in the few preceding years and which led to many ill-founded ventures. The technical and commercial aspects of the graphite business are peculiar, and it is only by persistent effort and experiment that success has been achieved in the utilization of the low-grade Adirondack deposits.

The main producer of graphite of late years has been the Joseph Dixon Crucible Co. operating the mine at Graphite, Warren county. The company also owns mines at Hague on Lake George and on Lead hill near Ticonderoga, but these are not now worked. The graphite is first separated at the mine and shipped to Ticonderoga for refining.

The Crown Point Graphite Co. has worked a deposit near Chilson lake, Essex county, which differs from the usual Adirondack type in that the graphite is associated with limestone. It is said to use a dry process for the recovery of the graphite. The product is refined in a finishing mill at Crown Point Center. The company expects to increase its output during the current season.

The Glens Falls Graphite Co. reported a small production from the mine at Conklingville.

The Empire Graphite Co., with a mine at Greenfield Center, Saratoga county, also contributed to the output in 1910.

The exploration of the Faxon property, situated near the Dixon or American mine at Graphite, which was mentioned in the review of the industry for 1909, has not as yet led to active mining operations. The recent work has demonstrated the existence of very extensive deposits of graphite rock, fairly rich and uniform in grade.

GYPSUM

The gypsum industry was very active during 1910, specially in western New York where the manufacture of calcined plasters has become an important branch. The returns from the mines and quarries showed a gain exceeding 20 per cent in the output of rock, or about the same ratio of increase as was indicated for the preceding year's output which outstripped all records up to that time.

The recent growth of the industry in view of the rather dull conditions in the buliding trades seems remarkable. No new mines

became productive during the past year and the increase came from enlarged operations on the part of enterprises already well established.

The output of rock or crude gypsum in 1910 was 465,591 short tons and the value of the marketed products as reported by the producing companies amounted to $1,122,952. The product in the preceding year was 378,232 short tons valued at $907,601. The actual gain for the year was thus 87,359 short tons in production and $215,351 in value. In the period since 1904 for which statistics have been collected by this office the production has expanded by more than 200 per cent.

The accompanying table gives the statistics for gypsum for the last two years. The figures are those returned by the mining companies. It may be noted that the items for calcined and ground plasters as given in the table probably fall a little below the actual amounts made from local materials, since some of the crude gypsum is sold to plaster mills outside of the mining district. The output of calcined plasters, including plaster of paris and wall plaster, on the above basis amounted in 1910 to 250,228 short tons with a value of $838,340. In 1909 the output was 209,223 short tons valued at $699,110. The amount ground for land plaster was 12,597 short tons valued at $28,100 against 9468 short tons valued at $19,283 in the preceding year. The sales of crude or lump gypsum, chiefly to portland cement works, amounting to 178,518 short tons valued at $256,512 as compared with 126,606 short tons valued at $189,208 in 1909.

Production of gypsum

MATERIAL	1909		1910	
	SHORT TONS	VALUE	SHORT TONS	VALUE
Total output, crude....	378 232	.....	465 591	.....
Sold crude.....	126 606	$189 208	178 518	$256 512
Ground for land plaster.	9 468	19 283	12 597	28 100
Wall plaster, etc., made.	209 223	699 110	250 228	838 340
Total value.....	.....	$907 601	.....	$1 122 952

The gypsum resources of the State have been described at length in a special report, issued as bulletin 143 of the New York State Museum. The information in the report is brought down to the year 1909; the interval that has since elapsed has been without any notable changes in the industry.

The growing demand for gypsum plasters in the building trade is the basis of the recent expansion of the industry. It was not until 1892 that the local gypsum found use in making calcined plaster and several years passed before the product assumed any importance. The entrance of the U. S. Gypsum Co. in the Oakland district about 1903 gave a strong impetus to the industry and may be regarded perhaps as marking the real beginning of the successful manufacture of calcined wall plaster which the resources of the company and its experience gained in other fields enabled it to establish on a permanent footing. With the rapid growth of the market for these materials other enterprises have naturally followed. The present capacity of the mines and mills is probably equal, however, to the demands that are likely to be made upon them for some time to come, and the opportunity for new developments seems somewhat limited so far as the immediate future is concerned.

The natural resources of the State are capable of supporting the industrial requirements for an indefinite period. The total production of gypsum from the start of mining about the year 1808 to the present has amounted probably to a little more than 5,000,000 tons. With the increasing rate of production now in progress an equal quantity will be taken out before the end of the present decade. But the mining operations of the past, or those likely to be undertaken in the future, appear insignificant as compared with the known extent of the deposits. The actual output in the past represents the equivalent of less than 500 acres of a 4 foot seam which is about the minimum thickness of a workable bed. The gypsum is found in a belt that extends from Madison county to Lake Erie, occurring as a regularly stratified member of the Salina formation of which the chief constituent is shale. The deposits of course have the elongated lenticular form characteristic of sedimentary strata and doubtless many gaps exist in the belt when they can not be exploited economically on account of insufficient size or unfavorable conditions as to surroundings. There is also considerable variation in the quality of gypsum; some seams, specially in the eastern sec-

tion, are too impure to be used for calcined plaster manufacture. These features call for careful investigation before mining developments are undertaken in any new locality, but they need scarcely be taken into account as fixing a limit upon the available supply in general.

IRON ORE

Iron mining was quite active last year, in fact the industry made a better showing on the whole than could have been anticipated from the trend of the iron trade. A total of about 1,500,000 tons of ore was hoisted from the mines, and the tonnage of furnace ore produced was well above the quantity reported in any previous year for a long time. The larger part of the shipments to furnaces consisted of magnetic concentrates, averaging about 65 per cent iron.

At the opening of the year the iron market showed a good deal of activity and seemed to foreshadow a prosperous season for mining. It began to weaken, however, after the first month or two and then as the season advanced fell off rapidly until prices were on a very low basis. The year closed without any immediate improvement in prospect. The effect of the slump was to discourage new enterprises and in some degree to curtail operations on the part of the active mines. A few companies ceased work altogether before the year ended. That the output held up so well in spite of the unfavorable market situation may be attributed probably to the sales of ore under contracts which served to keep most of the mines busy during the dull months.

In the Adirondacks exploratory work was carried on much as usual and the record of results compared well with that of any recent year. Promising developments were reported from the vicinity of Arnold hill, of which an account is given on a subsequent page. The Mineville-Port Henry district also received attention.

The accompanying table gives the statistics of production of the different classes of ores for the last two decades. The figures are based on the shipments of lump ore and concentrates to furnaces rather than the mine output. The volumes of the *Mineral Resources* published by the United States Geological Survey have supplied the data for the years previous to 1904.

Production of iron ore in New York State

YEAR	MAGNETITE	HEMATITE	LIMONITE	CARBONATE	TOTAL	Total value	Value per ton
	Long tons	Long tons	Long tons	Long tons	Long tons		
1890	945 071	196 035	30 968	81 319	1 253 393	.....	.....
1891	782 729	153 723	53 152	27 612	1 017 216	.....	.....
1892	648 564	124 800	53 694	64 041	891 099	$2 379 267	$2 67
1893	440 693	15 890	35 592	41 947	534 122	1 222 934	2 29
1894	.....	.....	.....	.....	242 759	.....	.....
1895	260 139	6·769	26 462	13 886	307 256	598 313	1 95
1896	346 015	10 789	12 288	16 385	385 477	780 932	2 03
1897	296 722	7 664	20 059	11 280	335 725	642 838	1 91
1898	155 551	6 400	14 000	4 000	179 951	350 999	1 95
1899	344 159	45 503	31 975	22 153	443 790	1 241 985	2 80
1900	345 714	44 467	44 891	6 413	441 485	1 103 817	2 50
1901	329 467	66 389	23 362	1 000	420 218	1 006 231	2 39
1902	451 570	91 075	12 676	Nil	555 321	1 362 987	2 45
1903	451 481	83 820	5 159	Nil	540 460	1 209 899	2 24
1904	559 575	54 128	5 000	Nil	619 103	1 328 894	2 15
1905	739 736	79 313	8 000	Nil	827 049	2 576 123	3 11
1906	717 365	187 002	1 000	Nil	905 367	3 393 609	3 75
1907	853 579	164 434	Nil	Nil	1 018 013	3 750 493	3 68
1908	663 648	33 825	Nil	Nil	697 473	2 098 247	3 01
1909	934 274	56 734	Nil	Nil	991 008	3 179 358	3 21
1910	1 075 026	79 206	4 835	Nil	1 159 067	3 906 478	3 37

The production in 1910 as reported by all the active mines was 1,159,067 long tons, valued at $3,906,478. This represented an increase of 168,059 tons over the total reported for the preceding year, which was 991,008 tons. It was the largest output contributed in any year since 1891; and the value was the highest ever reported without exception, though the average fell below the average values for 1906 and 1907.

The principal ore represented in the production was magnetite, the mines of which returned a total of 1,075,026 long tons valued at $3,721,383. The output of hematite, mainly from the Clinton belt, amounted to 79,206 tons valued at $175,425. A few thousand tons of limonite were mined in southeastern New York. There has been no production of carbonate ore in recent years.

Of the magnetite ore an aggregate of 653,963 tons was reported as consisting of concentrates and 421,063 tons of lump ore. The concentrates represented the product of 1,012,776 tons of crude material, so that the actual quantity hoisted from the magnetite mines in the year was 1,433,839 tons and from all the mines throughout the State 1,517,880 tons.

The list of active producers in 1910 included for the Adirondack region: Witherbee, Sherman & Co. and the Port Henry Iron Ore Co., at Mineville; the Cheever Iron Ore Co., Port Henry; the Chateaugay Ore & Iron Co., Lyon Mountain; the Benson Mines Co.,

Benson Mines; and the Salisbury Steel & Iron Co., Salisbury Center. The producers in southeastern New York were the Sterling Iron & Railway Co., Lakeville, and the Hudson Iron Co., Fort Montgomery. The single producer in the limonite region east of the Hudson river was the Amenia mine. The output of hematite was made by the Old Sterling Iron Co., with mines near Antwerp, Jefferson county; Furnaceville Iron Co.; the Ontario Iron Ore Co., Ontario Center; and C. A. Borst, Clinton.

Arnold. An important transaction in iron ore lands, which may lead eventually to a renewal of mining in southern Clinton county, is the recent purchase by Witherbee, Sherman & Co. of an extensive tract in the townships of Black Brook and Ausable, including the holdings of J. N. Stower and the Peru Steel & Iron Co. A large number of magnetite deposits occur within the area and altogether it may be considered one of the most promising properties in the Adirondack region. It embraces several old mines such as the Arnold, Cook, Mace, and Battie which at one time supported a very active industry in connection with the local forges. The Arnold mines have been intermittently active for the last century and were worked as late as 1906, since which time, however, no ore has been mined in this district.

Exploration of the property by the new owners has been under way since the latter part of 1909 and has already resulted in some encouraging developments. The Battie and Cook ore bodies, which so far have received most attention, have been demonstrated by surface excavations and diamond drill tests to be of much greater thickness and continuity than had been revealed in the earlier work. The two appear to form a practically connected deposit extending for a mile and a half or more on the strike. The ore pinches to small size and shows slight offsets in places, but as a whole exhibits a degree of regularity unusual to most Adirondack occurrences. It is entirely of concentrating grade, the magnetite being intermixed with quartz and dark silicates, or else interleaved with bands of rock so as to require mill treatment. The thicker portions of the deposit measure as much as 75 or 80 feet between the walls. Tests in the concentration of the magnetite have been conducted by an experimental plant set up in the Arnold mill nearby.

Benson Mines. The mines of this place were active during only a few months of the past year, having been closed in the late summer after a brief run. The general plan of operations proved unsatisfactory for economical production and it is unlikely that they will be reopened until a complete reorganization can be effected. The

main difficulty was reported to have been met in the mill treatment. On the recent resumption of mining it was thought that the old plant after alterations and additions of equipment could be utilized, but its operation involved heavy charges for handling the ore and disposal of the tailings, as well as other disadvantages incident to its situation. A number of novel features, as far as Adirondack practice is concerned, had been adopted so that the recent work was something of an experiment. The use of churn drills and steam shovels for breaking down and handling the ore is said to have proved satisfactory. Giant Edison rolls were employed for the first reduction in place of the usual jaw or gyratory crushers. Owing to the necessity of fine crushing in order to effect a good recovery of the magnetite, a considerable part of the concentrates was below the limit of size desirable for blast furnace use and had to be agglomerated before shipment. The fines were separated by an air blast and nodulized in rotary kilns heated by producer gas, a form of apparatus first adopted for the nodulizing of pyrites cinder. This process also effected a reduction of the sulfur content and was so successful that it will probably be used on all of the concentrates in case a new mill is erected.

Mineville. This is the most important iron mining center in the State, and for several years the ore shipments from Mineville have exceeded that of any other locality in the East. The mines are operated by Witherbee, Sherman & Co. and the Port Henry Iron Ore Co.

The combined output of the two companies last year was the largest on record. A total of 953,553 tons was hoisted from the mines and the product of lump ore and concentrates for shipment amounted to 842,279 tons as compared with 705,000 tons in 1909. The best previous year was 1907 when the shipments amounted to 751,155 tons.

The new Clonan shaft, put down by the Port Henry Co., was completed early in the year. The shaft has greatly facilitated mining in the lower or southern workings of the "21" ore body which were formerly reached only by a long incline. The shaft has three compartments, with a steel head frame equipped with grizzlies, crushers and storage bins. An independent steam-generating plant near the shaft furnishes the power for hoisting and underground work. The Welch mine north of "21" has continued to yield a fair output.

Another important addition to the surface equipment at Mineville completed during the year, is the Harmony mill of Witherbee,

Sherman & Co. This is a large concrete and steel structure situated between "A" and "B" shafts on the Harmony mines, just south of the Old Bed group. While the mechanical methods of ore treatment follow in a general way those adopted in the earlier mills, there are many features that make for increased efficiency and economy. The full running capacity of 200 tons an hour will probably be attained, considerably larger than the capacity of any other mill in this country for magnetic concentration of iron ores. The mill is designed to provide for the increasing output of the Harmony mines which are second in importance only to the Old Bed group.

According to present plans mining will soon be resumed in the Barton hill section. These deposits will be worked through a tunnel which has been driven into the south end of the hill so as to intersect the ore at some distance below the outcrop. Some ore was shipped from the mines last year in connection with experimental work in concentration. The ore differs from both the Harmony and Old Bed magnetite and the resumption of mining may necessitate the construction of another mill specially designed for its treatment.

With the progress of mining and exploration at Mineville new features of the ore occurrences are being uncovered each year. A deep test hole drilled during 1909 and 1910 from the tunnel of Barton hill encountered crystalline limestone and much dark hornblendic gneiss in association with the lighter ore-bearing gneiss. This is probably the first discovery of limestone in close proximity to the magnetite bodies and is of considerable interest, though its presence in the syenitic gneisses elsewhere is not altogether rare.

Cheever mine. The property of the Cheever Iron Ore Co., just north of Port Henry, has now reached a stage of development that assures a steady output of ore for some time to come. The mine had been dismantled and abandoned for twenty years or more. The work of draining and reopening has required time and has been attended to with some difficulty owing to the lack of information as to the situation and extent of the ore left in the old workings. Up to the middle of last year operations were mainly directed toward exploration and to the assembling of the necessary underground and surface plants.

Mining has been limited thus far to the southern part of the ore zone, which was tapped by the Weldon and Tunnel shafts of the former operative company. These shafts have been retimbered and a third shaft opened in the ground farther north. Some high grade

ore has been found in the old workings, mainly on the north side of the Weldon shaft. Large quantities of concentrating ore, sufficient to maintain operations for many years, also occur in that section. There is still much ground awaiting exploration which should add materially to the resources. The ore of concentrating grade has a stoping thickness up to 20 or 25 feet, considerably greater than that of the rich seams which alone were mined in the early operations.

Under steady production the mine should nearly double its shipment during the current year. Additions and improvements to the plant, recently made or now being supplied, will give an increased capacity as well as effect important economies. One of the new additions is a 400-horsepower, two-cylinder compressor which will allow the use of more than twice the number of drills now operated. Power for the compressor as well as for the hoists and mill is supplied by the Port Henry electric generating station of Witherbee, Sherman & Co.; no steam power is used. The equipment for handling the ore includes some labor-saving devices not usually found in mines of this character. An electric locomotive is employed underground for tramming the ore to the shaft, where the cars dump automatically into a receiving bin. A gravity tram transports the ore from the shaft to the mill and another lowers the concentrates to the railroad for shipment.

The entire output of the mine is sent to the mill. After the first crushing the product passes over a magnetic cobber which takes out about one-half of the magnetite in coarse form; it is then recrushed and goes to drum separators, and after a third crushing to belt machines. The concentrates carry above 58 per cent iron and about .35 per cent phosphorus. The mill is unpretentious, but it has treated 800 tons a day and has a good record for costs.

Salisbury. The Salisbury Steel & Iron Co. was active during a part of the year and made shipments of high-grade concentrates and cobbed ore to furnaces in New York and Pennsylvania. The company has one of the most complete surface equipments for handling and treating magnetite ores to be found in the State. An interesting feature is the use of producer gas for power purposes. The gas is made in the company's plant and supplies gas engines of 750-horsepower which are connected with electric generators that furnish current for driving all machinery in the mining and milling operations. An aerial tramway, 800 feet long, assembles the ore from the different workings and delivers it to the mill. The process of milling and concentration is similar to that used

elsewhere in the Adirondacks. The lump ore goes to Blake crushers, of which there are three of graduated size, and after screening passes to a series of magnetic cobbing machines. These take out the rich magnetite in coarse form which goes to storage bins for shipment. The rest of the material is subjected to further reduction in Cornish and finishing rolls and is then conveyed to magnetic separators of the belt type. The concentrates from these are delivered to separate storage bins. The shipping products are loaded on cars by a gravity system. The company has its own railroad which connects at Dolgeville with a branch of the New York Central.

Clinton hematites. The production of ore in the Clinton belt showed a good gain in 1910. The larger part of the output came from the western district in Wayne county, where the Furnaceville Iron Co. and the Ontario Iron Ore Co. were active and shipped regularly to Pennsylvania furnaces. The mines at Clinton were operated by C. A. Borst who supplied ore mainly for paint manufacture.

Dutchess county limonites. Though a renewed interest in the limonite deposits of this section has been manifest during the last year or two productive activity has been limited to the Amenia mine which resumed work in April, 1910. This is one of the more important properties which is credited with shipments of 200,000 tons of ore in the interval from 1870–90 when the mining industry was at its height. The present operations are limited to open-cut excavation near the surface, the old workings having been rendered inaccessible by fire. The output is about 25 tons of crushed ore a day. It is shipped to the furnace at New Canaan, Conn. The pig iron made from the ore finds special application for the manufacture of car wheels.

MILLSTONES

The quarrying and preparation of millstones, once a quite important industry in Ulster county, has shown a marked decline of late years. The industry in Ulster county dates back more than a century and for a long time has supplied a large share of the millstones and disks or chasers used in the country. The market for millstones, however, has been curtailed greatly by the increasing favor shown for rolls, ball mills and other improved forms of grinding machinery. The roller process has displaced almost entirely the old type of cereal mills, particularly in grinding wheat flour. The

small corn mills in the southern states are practically the only survivals of the old type and constitute one of the important markets for the New York millstones.

The millstones are quarried from the Shawangunk conglomerate, a light gray quartz-cemented rock that in places shows a marked gritty structure. Most of the quarries have been opened along the western edge of the Shawangunk mountain, near the valley of Rondout creek, and between Kerhonkson and High Falls. Kyserike, St Josen, Granite and Kerhonkson are the principal centers of the industry, but the stones are also shipped partly from New Paltz and Kingston. The quarries are worked intermittently, often as a subordinate business to farming or other occupations.

The work of quarrying requires only a small equipment, the stone being pried or broken out by hand bars and wedges, sometimes with the aid of powder. The spacing of the natural joint planes determines the size of the block. The latter is dressed by hand at the quarry into a disc through the center of which a circular hole is then drilled. The millstones vary in diameter from 15 inches to 54 inches or even larger. They are sold to grinders of cement, gypsum, paint etc. as well as to cereal mills. The chasers are disks dressed to run on edge in pans which are paved with blocks of the same material. The latter are also prepared at the quarries in roughly cubical shapes about a foot long. They are used in grinding hard materials like quartz and feldspar, and are usually made in the larger sizes from 54 to 72 inches in diameter, so as to give the weight necessary for crushing such minerals.

The value of the production of millstones, chasers and blocks amounted last year to about $7000. The sales were smaller than in any previous year for a long time. In 1909 the output was valued at about $15,000. The selling prices for millstones usually varied from $3 to $4 for a 16-inch stone up to $60 for a 72-inch stone. Chasers in size from 54 to 72 inches sold at prices ranging from $30 to $70 each.

MINERAL WATERS

New York has held for a long time a leading position among the states in the utilization of mineral waters. The different springs, of which over two hundred have been listed as productive at one time or another, yield a great variety of waters in respect to the character and amount of their dissolved solids. There are some that contain relatively large amounts of mineral ingredients and are specially valuable for medicinal purposes; Saratoga Springs, Balls-

ton Springs, Richfield Springs, Sharon Springs and Lebanon Springs are among the more noted localities for such waters. Numerous other springs are more particularly adapted for table use containing only sufficient mineral matter perhaps to give them a pleasantly saline taste. Both kinds of waters are generally carbonated and sold in small bottles.

Of late there has developed an important business in the sale of spring waters which can hardly be classed as mineral in the common acceptance of the word, but which are extensively consumed for office and family use in the larger towns and cities. Their employment depends upon their freedom from harmful impurities, in which feature they are generally superior to the local supplies. In so far as such waters are an article of commerce they may well be included in a canvass of the mineral water industry. They are usually distributed in large bottles or carboys in noncarbonated condition.

Character of mineral waters. Among the spring waters that contain mineral ingredients in appreciable quantity those characterized by the presence of alkalis and alkaline earths are the most abundant in the State. The dissolved bases may exist in association with chlorin and carbon dioxid, as in the springs of Saratoga county, or they may be associated chiefly with sulfuric acid, as illustrated by the Sharon and Clifton springs.

The mineral waters of Saratoga Springs and Ballston are found along fractured zones in Lower Siluric strata, the reservoirs occurring usually in the Trenton limestone. They are accompanied by free carbon dioxid, which together with chlorin, sodium, potassium, calcium and magnesium, also exists in dissolved condition. The amount of solid constituents in the different waters varies from less than 100 to over 500 grains per gallon. Large quantities of table and medicinal waters are bottled at the springs for shipment to all parts of the country. The carbon dioxid which issues from the wells at Saratoga is likewise an important article of commerce.

The waters at Richfield Springs contain the elements of the alkali and alkaline earth groups together with sulfuric acid and smaller amounts of chlorin, carbon dioxid and sulfureted hydrogen. They are employed for medicinal baths as well as for drinking purposes. The springs issue along the contact of Siluric limestone and Devonic shales. Sharon Springs is situated to the east of Richfield Springs and near the contact of the Lower and Upper Siluric. Clifton Springs, Ontario county, and Massena Springs, St Lawrence county, are among the localities where sulfureted waters occur and are utilized.

The Oak Orchard springs in the town of Byron, Genesee county, are noteworthy for their acid waters which contain a considerable proportion of aluminum, iron, calcium and magnesium, besides free sulfuric acid.

The Lebanon spring, Columbia county, is the single representative in the State of the class of thermal springs. It has a temperature of 75° F. and is slightly charged with carbon dioxid and nitrogen.

Ordinary spring waters. The greater quantity of spring waters consumed in the State belongs to the nonmedicinal, noncarbonated class, represented by such springs as the Great Bear, Deep Rock, Mount View, Sun Ray, Chemung etc. The waters are obtained either from flowing springs or from artesian wells and are shipped in carboys or in tank cars to the principal cities where they are bottled and distributed by wagons among the consumers. The essential feature of such waters is their freedom from noxious impurities. This is generally safeguarded by the care exercised in the handling of the waters which are also regularly examined in the chemical and bacteriological laboratories.

Carbon dioxid. Besides the sale of mineral waters an extensive industry has been developed in connection with carbon dioxid which is given off as gas by some of the springs. The collection, storage and shipment of the gas for use in making carbonated beverages and for other uses has received attention at Saratoga Springs, where the industry for some time attained even greater importance than the trade in the mineral waters themselves. Over thirty wells have been driven in that vicinity for gas alone. The carbon dioxid, together with the water, is pumped to the surface, separated from the water at the well and then is conveyed to gas holders where it is stored preparatory to charging into cylinders. The cylinders in which it is shipped to consumers are made to withstand the heavy pressure necessary to liquify the gas and are of two sizes, the smaller holding about 25 pounds and the larger from 40 to 50 pounds. The principal producers have been the New York Carbonic Acid Gas Co., the Lincoln Spring Co., and the National Carbonic Gas Co. The gas is said to be superior to that produced by the calcination of magnesite or other artificial methods.

List of springs. The following list includes the names and localities of most of the springs in the State that are employed commercially, as shown by a canvass of the industry:

Name	Locality
Baldwin Mineral Spring	Cayuga, Cayuga co.
Coyle & Caywood	Weedsport, Cayuga co.
Diamond Rock Spring	Cherry Creek, Chautauqua co.
Mrs D. N. Palmer	West Portland, Chautauqua co.
Breesport Oxygenated Mineral Spring	Breesport, Chemung co.
Chemung Valley Spring	Elmira, Chemung co.
Chemung Spring	Chemung, Chemung co.
Lebanon Mineral Spring	Lebanon, Columbia co.
Monarch Spring	Matteawan, Dutchess co.
Mt Beacon Spring	Matteawan, Dutchess co.
Mount View Spring	Poughkeepsie, Dutchess co.
Ayers Amherst Mineral Spring	Williamsville, Erie co.
Elk Spring Water Co	Lancaster, Erie co.
Beauty Spring Water Co	Lyons Falls, Lewis co.
Cold Spring	New York Mills, Oneida co.
Glacier Spring	Franklin Springs, Oneida co.
Lithia Polaris Spring	Booneville, Oneida co.
G. Wells Smith	Franklin Springs, Oneida co.
W. W. Warner	Franklin Springs, Oneida co.
Geneva Lithia Spring	Geneva, Ontario co.
Red Cross Spring	Geneva, Ontario co.
Crystal Spring	Oswego, Oswego co.
Deep Rock Spring	Oswego, Oswego co.
Great Bear Spring	Fulton, Oswego co.
J. Hagerty	Oswego, Oswego co.
Os-we-go Spring	Oswego, Oswego co.
Redstone Spring	Oswego, Oswego co.
Mammoth Spring	North Greenbush, Rensselaer co.
Shell Rock Spring	East Greenbush, Rensselaer co.
Massena Mineral Spring	Massena Springs, St Lawrence co.
Arondack Spring	Saratoga Springs, Saratoga co.
Artesian Lithia Spring	Ballston Springs, Saratoga co.
Chief Spring	Saratoga Springs, Saratoga co.
Congress Spring	Saratoga Springs, Saratoga co.
Geyser Spring	Saratoga Springs, Saratoga co.
Hathorn Spring	Saratoga Springs, Saratoga co.
Hides Franklin Spring	Ballston Springs, Saratoga co.
High Rock Spring	Saratoga Springs, Saratoga co.
C. N. Mead	Ballston Springs, Saratoga co.

Name	Locality
Patterson Mineral Spring.....	Saratoga Springs, Saratoga co.
Royal Spring.....	Saratoga Springs, Saratoga co.
Saratoga Seltzer Spring.....	Saratoga Springs, Saratoga co.
Saratoga Carlsbad Spring.....	Saratoga Springs, Saratoga co.
Saratoga Emperor Spring.....	Saratoga Springs, Saratoga co.
Star Spring.....	Saratoga Springs, Saratoga co.
Washington Lithia Spring.....	Saratoga Springs, Saratoga co.
Chalybeate Spring.....	Sharon Springs, Schoharie co.
Eye Water Spring.....	Sharon Springs, Schoharie co.
Gardner White Sulphur Spring.	Sharon Springs, Schoharie co.
Magnesia Spring.....	Sharon Springs, Schoharie co.
Red Jacket Spring.....	Seneca Falls, Seneca co.
H. W. Knight.....	Seneca Falls, Seneca co.
Pleasant Valley Mineral Spring..	Rheims, Steuben co.
Setauket Spring.....	Setauket, Suffolk co.
Sparko Crystal Spring.....	Huntington, Suffolk co.
Elixir Spring.....	Clintondale, Ulster co.
Sun Ray Spring.....	Ellenville, Ulster co.
Vita Spring.....	Fort Edward, Washington co.
Briarcliff Table Water.....	Briarcliff Manor, Westchester co.
Gramatan Spring Water Co....	Bronxville, Westchester co.
Putnam Spring Water Co.....	Peekskill, Westchester co.

Production. The reports received from the mineral water trade for the year 1910 showed sales of 8,432,672 gallons valued at $675,-039. The number of springs contributing to the production was 46. In the preceding year the sales amounted to 9,019,490 gallons valued at $857,342 from 48 springs. The value of the water is estimated at the spring localities and does not include the cost of bottling. No account is made of the waters used in hotels, sanitariums etc. run in connection with the springs, though this is an important branch of the business in some places.

The falling off in the sales as shown by the above figures may be attributed mainly to the decreased use of the higher priced carbonated waters which contain considerable amounts of mineral matter. The trade in the ordinary spring waters of the nonmedicinal class seems to have gained a permanent foothold and to be of growing importance.

NATURAL GAS

Natural gas is produced in fifteen counties of the State, all of which are situated in the western half in the section between Lake Ontario and the Pennsylvania boundary. The principal fields are in Erie, Chautauqua, Allegany, and Cattaraugus counties, but scattered pools occur as far east as Oswego county. The eastern part of the State seems to be barren of productive pools at least nothing of importance has been found there after persistent and rather thorough exploration; the disturbed condition of the strata perhaps has prevented the accumulation of gas in quantity.

The range of the gas pools geologically may be said to extend from the base of the Paleozoic sedimentary formations, the Potsdam sandstone, to the Chemung and Portage formations of the Devonic, which are near the top of the Paleozoic series as represented in New York. Certain formations, however, are more prolific than others, and the wells in each field, as a rule, derive their main supply from a definite horizon. In Erie county the more important pools have been found in the Medina sandstone, which is also the source of the supply of the new Pavilion field in Genesee county and of the recent fields opened in northern Chautauqua county. The Portage and Chemung formations of the Devonic yield perhaps most of the gas obtained from the fields of southern Allegany and Cattaraugus counties. Another important horizon is the Trenton which contributes most of the supply in Onondaga and Oswego counties.

The production of natural gas has increased markedly of late years, despite the fact that many of the fields have been exploited for a long time. The wide demand for this cheap and convenient source of heat and light has been an incentive to active exploration that has extended into every promising section. The recent additions to the supply have come principally from the drilling in old territory of deep wells which tap the lower productive strata like the Medina sandstone rather than from any extensions of the geographic limits of the fields.

The reports received from the producers for the year 1910 showed a total of about 1340 productive wells of which the output was used for fuel and lighting purposes. This does not include the wells in the oil region which supply gas for pumping operations. The number of individual producers was about two hundred, most of whom, however, made only a small output from one or two wells for their own supply. Aside from these minor enterprises, there were some forty companies who produced and distributed gas in

quantity for the supply of cities and communities in the western part of the State.

The surplus gas from the oil region of Cattaraugus, Allegany and Steuben counties is collected by the Empire Gas Co. of Wellsville; the Producers Gas Co. of Olean; and the United Natural Gas Co. of Oil City, Pa. The product is distributed in pipe lines to different places as far distant as Buffalo. This city is also supplied from the important fields in the eastern and southern townships of Erie county and also in part from Pennsylvania. The gas from the other fields is mainly consumed by the towns and villages within short distances of the wells.

The value of the natural gas production during the last four years is given in the accompanying table which is arranged to show also, so far as practicable, the contributions from the principal counties. The returns for the year 1910 indicated a production valued at $1,411,699, much the largest that has been reported. The output in 1909 was valued at $1,045,693, so that the actual gain from the year was $366,006 or about 35 per cent. In quantity the output also reached record figures with a total of 4,815,643,000 cubic feet against 3,825,215,000 cubic feet for the preceding year. These quantities include estimates for some of the smaller producers who have no meters attached to their mains, but they are believed to be close approximations of the actual production. On the basis of the above totals the average value of the gas was 29 cents a thousand in 1910 and 27 cents a thousand in 1909. The actual selling prices of the different companies who supplied gas to consumers ranged from a minimum of about 20 cents to a maximum of 50 cents a thousand.

Production of natural gas

COUNTY	1907	1908	1909	1910
Allegany–Cattaraugus	$250 159	$264 736	$282 964	$337 427
Chautauqua	106 411	153 019	174 597	202 754
Erie [1]	320 199	451 869	461 531	717 038
Livingston [2]	55 780	54 083	59 888	60 997
Onondaga	17 030	13 837	12 310	12 733
Oswego	10 585	12 800	14 402	14 783
Wyoming [3]	39 850	37 431	40 001	65 967
Total	$800 014	$987 775	$1 045 693	$1 411 699

[1] Includes a part of the production of Genesee county.
[2] Includes also Seneca, Schuyler, Steuben, Ontario and Yates.
[3] Includes also Niagara and Genesee.

A comparison of the statistics shows that Erie county leads all others in the quantity and value of production. Its contribution last year amounted to 2,241,660,000 cubic feet valued at $717,038, from a total of 293 wells. The greater part of the output came from the eastern townships where the principal producers were as follows: Akron Natural Gas Co., Alden-Batavia Natural Gas Co., Lancaster-Depew Natural Gas Co., Niagara Light, Heat & Power Co., and the United Natural Gas Co. The company last named also operated in the Allegany-Cattaraugus field and in southern Erie county. The Springville Natural Gas Co. and the Angola Gas Co. were large producers in southern Erie county.

The production listed under Allegany and Cattaraugus counties included mainly the gas collected from oil wells, but there was also a small output from fields in the northern parts of the two counties where no oil is found. It has been impossible to separate the figures of the two counties. The combined output taken from the reports of the pipe-line companies and the individual producers amounted in 1910 to 1,361,426,000 cubic feet, valued at $337,427, from a total of 768 wells. The output of this district was mainly handled by the Empire Gas & Fuel Co., the Potter Gas Co., the Producers Gas Co., and the United Natural Gas Co.

Chautauqua, which held third place in the industry, contributed an output of 751,588,000 cubic feet valued at $202,754. The principal supply came from the deep wells which have been put down during the last few years in the belt along Lake Erie. The leading producers were the Frost Gas Co., Silver Creek Gas & Improvement Co., South Shore Gas Co., and the Welch Gas Co. Aside from these companies who operated pipe lines for the supply of gas to the public, there were many individual producers owning one or two wells for private use.

Genesee county has recently taken an important place in the natural gas industry through the development of a very productive field near Pavilion. The output last year showed the largest relative increase of any county in the State. The Pavilion Natural Gas Co. and the Alden-Batavia Natural Gas Co. have been the chief operators in the district.

The record for 1910 showed considerable activity in exploration and new drilling, and to this may be attributed the large gain of production. Genesee and eastern Erie counties continued to yield good results, though the discovery of no new pools was reported. The exploration of the abandoned Zoar oil field of northern Catta-

raugus county attracted much attention, but the results as yet have not been made public. In this work the United Natural Gas Co. has been chiefly engaged. The first well drilled in 1909 found gas at 3300 feet. The second well put down last year was said to have encountered oil sand with gas at 2500 feet. The same company has been active in acquiring other properties in northern Cattaraugus and southern Erie counties and will construct a pipe from that region to Buffalo. In Chautauqua county the Welch Gas Co. drilled a well just west of the village of Westfield which showed an estimated flow of 300,000 cubic feet a day. The Frost Gas Co. and the South Shore Gas Co. put down several wells in the same region.

PETROLEUM

An output of 1,073,650 barrels was reported last year from the oil field in the southwestern part of the State. This represented a slight reduction from the total returned in 1909 which amounted to 1,160,402 barrels, but was about an average yield for the wells in this field. Owing to the marked decline in the prices paid for crude oil by the refining companies, the value of the output was lower than it has been in a long time and at the average market quotations amounted to $1,458,194 or $1.36 a barrel, as compared with $1,914,663, an average of $1.65 a barrel for the preceding year.

As a result of the fall in prices, exploratory operations were conducted on a much reduced scale, which no doubt will have a very apparent effect on the production of the current season.

The oil field of New York is a part of the Appalachian district which reaches its main development in Pennsylvania, Ohio and West Virgina. The pools occur in fine-grained sandstones of dark color belonging to the Chemung formation of the Upper Devonic system and are scattered through the southern parts of Cattaraugus and Allegany counties near the Pennsylvania border. The productive area in Cattaraugus county includes Olean, Allegany and Carrolton townships with an area of about 40 square miles. Some of the larger pools in this county are the Ricebrook, Chipmunk, Allegany and Flatstone. The wells average from 600 to 1800 feet deep. In Allegany county are the Bolivar, Richburg, Andover and Wirt pools which extend across the southern townships and are tapped by wells averaging from 1400 to 1800 feet deep. The Andover field lies partly in the town of West Union, Steuben county. A recent estimate places the number of productive wells in Allegany county at 6000, and the total number in the entire field probably exceeds 10,000.

In view of the long career of the productive industry in New York, it seems surprising that the field should continue to show so good results. There have been no important pools discovered in many years, but by continual exploration of old territory and by the use of the gas found in the wells for pumping, the yield has been maintained at a fairly constant level. The average product now is less than a barrel a day from each well. The quality of the oil is such that it commands the highest prices in the eastern markets, and this feature is the main incentive to the small-scale operations.

The production of oil during the last two decades is shown in the accompanying table. The figures for the years 1891–1903 inclusive have been compiled from the annual volumes of the *Mineral Resources,* while those for subsequent years are based on reports received from the pipe-line companies who transport the oil to the refineries. The following companies operate pipe lines in the New York field: The Allegany Pipe Line Co., Columbia Pipe Line Co., Union Pipe Line Co., and Fords Brook Pipe Line Co., of Wellsville; Vacuum Oil Co. of Rochester; New York Transit Co. of Olean; Emery Pipe Line Co., Kendall Refining Co., and Tide Water Pipe Co., Limited, of Bradford, Pa.

Production of petroleum in New York[1]

YEAR	BARRELS	VALUE
1891	1 585 030	$1 061 970
1892	1 273 343	708 297
1893	1 031 391	660 000
1894	942 431	790 464
1895	912 948	1 240 468
1896	1 205 220	1 420 653
1897	1 279 155	1 005 736
1898	1 205 250	1 098 284
1899	1 320 909	1 708 926
1900	1 300 925	1 759 501
1901	1 206 618	1 460 008
1902	1 119 730	1 530 852
1903	1 162 978	1 849 135
1904	1 036 179	1 709 770
1905	949 511	1 566 931
1906	1 043 088	1 721 095
1907	1 052 324	1 736 335
1908	1 160 128	2 071 533
1909	1 160 402	1 914 663
1910	1 073 650	1 458 194

[1] The statistics for the years 1891–1903 inclusive are taken from the annual volumes of the *Mineral Resources.*

The most notable feature in the industry recently has been the violent break in the market prices of crude oil from the Appalachian field. The quotations for Pennsylvania crude, which are taken as the basis for rating the New York output, fell off from $1.78 a barrel, the average price paid in the early months of 1909, to $1.43 a barrel at the close of that year. A further decline took place during the past season which brought the quotations down to $1.40 a barrel at the opening and finally to $1.30 a barrel, the ruling price for the last few months.

In response to the market decline there was a notable decrease of activity in new drilling. The records for the past year showed that a total of 283 wells were completed in New York as compared with 457 wells in 1909. The increment of production from the new wells amounted to 368 barrels a day, while in 1909 it was 715 barrels. Of the number drilled 61 were dry holes as compared with 32 in the preceding year.

PYRITE

The production of pyrite, confined to St Lawrence county, showed a large increase last year and reached the highest total that has been recorded for the State. Most of the ore came from the mines at Stellaville, near Hermon, owned by the St Lawrence Pyrite Co. which for several years previous had supplied the entire output. During the last season the Cole mine, near Gouverneur, which had been closed since 1907, resumed operations and contributed to the product.

The pyrite deposits of this section are associated with belts of gneisses, schists and crystalline limestones — the same series of rocks that inclose the hematite ores which have been mined at various places in St Lawrence and Jefferson counties. The principal belt of these metamorphosed strata extends from near Antwerp, Jefferson county, across Gouverneur, De Kalb and Clinton townships, St Lawrence county, a distance of some 40 miles. Pyrite zones are found at intervals along the belt, following the general northeast-southwest strike and extending for variable distances. The pyrite is generally intermixed with quartz, hornblende and feldspar and other minerals of the wall rocks so as to form a lean ore. In places, however, bands and lenticular bodies of fairly rich pyrite occur and it is these which constitute the workable deposits.

Up to the present time mines have been opened only at three localities; near High Falls on the northeastern end of the belt, at Stellaville in the town of De Kalb and near Gouverneur. The

High Falls deposits have not been actively worked in the last five years, though they were recently explored by diamond drilling.

The mines at Stellaville operated by the St Lawrence Pyrite Co. are opened on a parallel series of pyrite bodies, of which the largest is known as the Stella. A second important deposit, the Anna, is found in the footwall 1600 feet to the southeast and others occur in the interval. The ore carries from 15 to 40 per cent of sulfur, with an average probably between 25 and 30 per cent. The mine output is crushed and concentrated so as to bring the sulfur up to 40 per cent or more. The concentrates are shipped to acid burners in the East. Though of lower sulfur content than the imported ores they are desirable material for acid making on account of their freedom from arsenic and other injurious impurities.

The Cole mine, just north of Gouverneur, is based on a large outcropping deposit that was first worked as an open cut. Under the early operations by the Adirondack Pyrite Co. extensive shipments of lump ore were made, as much of the output was sufficiently rich to be used without concentration. The property was equipped with a mill, however, for treating the leaner material. Recently work has been renewed by the Hinckley Fibre Co., which used the output last year in connection with sulfur pulp manufacture at Hinckley.

Besides these mines there are many prospects and exposures of pyrite in the metamorphic belt of Jefferson and St Lawrence counties. As has been noted by C. H. Smyth, the hematite ores of that section are often accompanied by bodies of pyrite in the adjoining wall rocks. The iron ores in fact have probably been derived from the decomposition of the pyrite and their distribution affords a useful clew to exploration for the latter mineral. Some of the better known localities are on the Alexander Farr farm, two and a half miles northeast of Bigelow; on the George Styles farm one and a half miles west of Bigelow; S. Hendricks one mile south of Bigelow; and L. Hockens seven miles west of Rensselaer Falls. Near Antwerp pyrite is found in vicinity of the Dixon and Old Sterling mines; it is also found farther north in the vicinity of Ox Bow.

The pyrite industry in this section has not evidenced, hitherto, the activity that might have been expected from its favorable situation in regard to markets. The fact that the ores are low grade for the most part has restricted their exploitation, as they could not be shipped any distance without concentration. This has involved the erection of expensive milling plants and a heavy outlay for other development.

Recent experiments in the use of low-grade pyrite for sulfite manufacture are said to have been successful and to have demonstrated that ores carrying but 25 or 30 per cent sulfur can be economically employed if obtainable at low cost. Under such conditions there should be opportunity for enlarging the output from the deposits which are within easy shipping distance of the Adirondack sulfite mills. According to a leading manufacturer in that section, the output of sulfite fiber by the local plants amounts to about 900 tons a day, for which 135 tons of commercial sulfur, at an average cost of $3300, are consumed. An output of from 400 to 600 tons of pyrite of the grade found in northern New York would be required to supply the equivalent of that amount of sulfur.

SALT

The salt industry of the State is very important; the annual output amounts to about one-third of the total for the entire country. The local product thus finds an extensixe market, and it is in fact the excellent situation with respect to trade facilities that are supplied by the railroads and canals of the State, more than any other factor apparently, that has been responsible for the continued progress of the industry. Of late years competition has been very keen, owing to the growth of the production in Michigan and the states of the Middle West, which has curtailed the outlet for the local product in that direction. Michigan is also a competitor for the eastern trade in evaporated salt, as a lower cost of manufacture counterbalances to some extent at least the shipping advantages which the local producers enjoy. The latter supply, of course, the greater part of the New York and New England requirements and will doubtless continue to hold a preponderant share of this trade in the future. The rock salt from New York is marketed over a wide territory; until recently it has had no near competitors, though the cheaper grades of evaporated salt are used as a substitute when they can be obtained at sufficiently low prices. Since 1909 Michigan has been a producer of rock salt, a mine having been opened in that year near Detroit.

Returns received from the companies engaged in the salt industry for the year 1910 showed a slight gain of production which brought the total up to a new record, but in other respects the conditions appear to have been rather unsatisfactory. Prices were lower than at any time for a number of years. The increased output was due to the activity in rock salt and in the manufacture of alkali products. The salt used for alkali manufacture is consumed in the form of

brine without evaporation. The actual product of evaporated salt for the market was less than in 1909.

The total quantity reported by the mines and wells for last year was 10,270,273 barrels of 280 pounds, as compared with 9,880,618 barrels in 1909, showing an increase of 389,655 barrels or about 4 per cent. The production in 1909 was the largest up to that time and represented a gain of 875,307 barrels for that year. Converted to a tonnage basis the output in 1910 amounted to 1,437,838 short tons against 1,383,386.5 short tons in the preceding year.

Notwithstanding the gain in quantity, as shown in the above figures, the value of the output last year was less than that reported in 1909, the amount being $2,258,292 as compared with $2,298,652. The value averaged 22 cents a barrel, against 23.3 cents a barrel in 1909; 23.7 cents in 1908 and 25 cents in 1907. Prices have thus diminished steadily for a number of years. It is to be noted, however, that the average values are reduced to some extent by the inclusion of the salt used in the form of brine for alkali manufacture. Since this salt is not marketed as such and is not even evaporated it is given only a nominal valuation, representing practically the cost of pumping. The production of this brine is confined to a single company, the Solvay Process Co., which has a number of wells in the town of Tully, Onondaga county, whence the brine is carried through a pipe line to the alkali works near Syracuse.

The year was unmarked by any notable developments or changes in the industry. The list of producers included about thirty works and mines or the same number as in 1909. Under the conditions which have obtained during the last few years, there has been no incentive to the establishment of new enterprises. On the other hand the low prices for evaporated salt have caused the closing of some of the smaller plants and those less favorably situated with respect to manufacturing and marketing facilities. Another effect has been to introduce more economical methods by the use of the grainer and vacuum pan which have generally superseded the old kettle or direct-fire process of evaporation.

A small part of the evaporated salt is made by the solar process. Its manufacture is limited to Syracuse and vicinity where it has survived from the early days of the industry, though it has lost its former importance. The product is mainly coarse salt and is used for practically the same purposes as rock salt. It is marketed through the Onondaga Coarse Salt Association. The wells are situated on lands once included within the Onondaga reservation;

until recently the State supplied the brine to the individual plants, exacting a small tax on the product to cover the cost of pumping and supervision. The lands and wells were sold in 1908 to private companies and the historic connection of the State with the salt business has been definitely terminated. Solar salt is made from a natural brine, the only instance of its use in New York.

The accompanying tables give the statistics of salt production for recent years. The output for 1909 and 1910 is distributed according to grades, so far as the classification could be made without revealing the individual figures. The grades depend upon methods of manufacture and the purposes for which the salt is used. Rock salt and salt in brine consumed by the alkali industry appear in the last item of the tables which also includes small quantities of evaporated salt not specially classified in the returns. The evaporated salt is chiefly marketed under the grades of common fine and table and dairy salt. Common coarse, coarse solar, and packers are the other grades of evaporated salt. The prices range all the way from about 50 cents a barrel for the table and dairy grade down to a few cents for the salt used for chemical manufacture.

Production of salt by grades in 1909

GRADE	BARRELS	VALUE	VALUE PER BARREL
Common fine [1]	1 436 233	$494 464	$ .35
Common coarse	130 200	45 569	.35
Table and dairy	1 281 207	633 195	.50
Coarse solar	540 614	162 253	.30
Packers	99 123	38 344	.40
Other grades [2]	6 393 241	924 877	.14
Total	9 880 618	$2 298 652	$ .233

[1] Common fine includes a small amount of common coarse.
[2] Include rock salt, salt in brine used for soda manufacture, and small amounts of brine salt or which the uses were not specified in the returns.

Production of salt by grades in 1910

GRADE	BARRELS	VALUE	VALUE PER BARREL
Common fine [1]	1 322 015	$378 547	$ .28
Common coarse	243 928	81 233	.33
Table and dairy	1 258 089	611 271	.49
Coarse solar	439 780	129 295	.29
Packers	37 935	13 277	.35
Other grades [2]	6 968 526	1 044 669	.15
Total	10 270 273	$2 258 292	$ .22

[1] Common fine includes a small amount of common coarse.
[2] Include rock salt, salt in brine used for soda manufacture, and small amounts of brine salt for which the uses were not specified in the returns.

Six counties of the State are represented in the industry. Livingston county leads in quantity and value of output, its importance being due chiefly to the mines of rock salt, of which there are two in active operation, situated at Retsof and Cuylerville and owned respectively by the Retsof Mining Co. and the Sterling Salt Co. The mines are worked through vertical shafts from 1000 to 1100 feet deep. They are capable of a much larger output than is made at present. The Genesee Salt Co. is the only producer of evaporated salt in Livingston county.

Onondaga county ranks second in output though it actually produces little marketable salt. Its prominence is due to the operations of the Solvay Process Co., whose alkali works at Solvay are the largest of the kind in this country.

The other counties in order of production are Tompkins, with three evaporating plants, two of which are owned by the International Salt Co., and the other by the Remington Salt Co.; Wyoming county with two plants, owned by the Worcester Salt Co., and the Rock Glen Salt Co.; Schuyler county with two works, owned by the International Salt Co., and the Watkins Salt Co.; and Genesee county with the single plant of the Le Roy Salt Co.

The salt production during the last 25 years is summarized in the accompanying table which has been prepared from the preceding issues of this report and from the statistics published in the volumes of the *Mineral Resources*, issued by the United States Geological Survey.

Production of salt in New York since 1886

YEAR	BARRELS	VALUE
1886	2 431 563	$1 243 721
1887	2 353 560	936 894
1888	2 318 483	1 130 409
1889	2 273 007	1 136 503
1890	2 532 036	1 266 018
1891	2 839 544	1 340 036
1892	3 472 073	1 662 816
1893	5 662 074	1 870 084
1894	6 270 588	1 999 146
1895	6 832 331	1 943 398
1896	6 069 040	1 896 681
1897	6 805 854	1 948 759
1898	6 791 798	2 369 323
1899	7 489 105	2 540 426
1900	7 897 071	2 171 418
1901	7 286 320	2 089 834
1902	8 523 389	1 938 539
1903	8 170 648	2 007 807
1904	8 724 768	2 102 748
1905	8 575 649	2 303 067
1906	9 013 993	2 131 650
1907	9 657 543	2 449 178
1908	9 005 311	2 136 736
1909	9 880 618	2 298 652
1910	10 270 273	2 258 292

SAND AND GRAVEL

Surficial deposits of sand and gravel are widely distributed in the State and supply most of the needs for such materials in local building, engineering and metallurgical operations. The molding sands of the Hudson river region also have an extensive sale outside of the State.

The sand and gravel deposits are mainly of glacial origin, as the whole territory within the limits of New York, in common with the northern section of the United States east of the Rocky mountains, was invaded by the Pleistocene ice sheet which removed all the loose material accumulated by previous weathering and erosion and left on its retreat a mantle of transported boulders, gravels, sands and clays. In places these have the character of unmodified drift, or morainal accumulations in which the materials are more or less intermixed, and are then of little industrial value. But more generally the deposits show a sorted stratiform arrangement due to their having been worked over by the glacial streams and lakes. Such is the condition in many of the larger valleys like those of the

Hudson, Genesee and Champlain, where the sands, gravels and clays occur separately in terraced beds extending far above the present water level. Later water action may have effected a beneficial resorting of the materials as in the case of the beach sands on Long island and some of the lakes in the interior of the State.

The industry based on the extraction of sand and gravel for industrial uses is a very large one, but the conditions under which it is carried on make it very difficult to obtain complete or reliable information of current production. The operations are widely scattered and in most sections of the State have little permanency. For the year 1910 the reports received from the industry show a production of sand and gravel of all kinds amounting in value to $2,129,708. This total should be considered as an approximation only and is based on the reports of about one hundred producers and dealers in the business. It undoubtedly represents the larger part of the output, but may fall short of the actual total by as much as 25 per cent, due to incomplete returns from the building sand trade.

Production of sand and gravel

MATERIAL	1908	1909	1910
Molding sand	$277 290	$437 402	$424 015
Core sand	22 371	30 230	[c] 33 709
Building sand	666 809	[b]	1 016 598
Other sand[a]	43 368	[b]	65 835
Gravel	120 453	[b]	589 551
Total	$1 130 291	.....	$2 129 708

[a] Includes glass sand, furnace sand, filter sand, engine and polishing sand.
[b] Statistics not collected.
[c] Includes also fire sand.

Molding sand. The use of sand for the casting of metals calls for a large supply of special grades which have a rather limited distribution, compared with building sands, and consequently greater value.

In New York there are two main areas in which good molding sands occur: (1) on the lands bordering the Hudson river on both sides from Orange to Saratoga county; (2) in Erie county. The sand is found in shallow deposits immediately beneath the sod and often covers extensive tracts. In the Hudson river region, which is by far the most important, beds 8 inches thick may be worked if convenient to transportation. From this they range up to 7 or 8 feet

thick, though usually the finer grades occur in relatively thin beds. The sand is graded roughly according to size, which varies from extremely fine sand that will pass through a 100-mesh sieve to rather coarse gravel. The business of mining and shipping the sand is mainly conducted by a few large companies who operate in several places and are able to furnish all the grades demanded by the foundries.

The production of molding sand in 1910 amounted to 471,351 short tons valued at $424,015, or almost the same as in the preceding year when the total was 468,609 tons valued at $437,402. These figures are probably close to the actual amounts, as the molding sand trade is on a fairly stable basis and can be canvassed with some degree of accuracy.

Of the total production last year the Hudson river region furnished 448,805 tons valued at $406,542. The remaining 22,546 tons valued at $17,473 came mainly from Erie county, though small quantities were reported from Cayuga, Chautauqua, Essex, Livingston, and Oneida counties. In 1909 the Hudson river region contributed an output of 450,989 tons valued at $422,144.

Core sand used in connection with molding sand for the cores of castings is obtained from Oneida lake and from Erie county. Its production in 1909 amounted to 30,230 tons valued at $25,472. For 1910 the figures were included with those of fire sand, the combined total of the two materials amounting to 76,589 tons valued at $33,709.

Building sand. The use of sand and gravel in building and engineering work calls for enormous quantities of those materials and is the basis of a productive industry that is carried on more or less actively in nearly every county of the State. The business is purely local, as the towns and cities are generally well supplied with deposits close at hand. The value of the materials is mainly represented in the cost of excavation.

An incomplete census of the industry for the past year showed a production of sand and gravel valued at $1,606,149. Of this value sand constituted $1,016,598 and gravel $589,551. The quantity of sand reported was 3,838,976 cubic yards and of gravel 1,037,026 cubic yards, a total of 4,876,002 cubic yards. Reports were received from 56 producers distributed among 32 counties. The largest business was on Long island, principally in Nassau county, where the supply for New York is obtained. Nassau county alone contributed a total of 2,903,600 cubic yards valued at $1,020,247.

SLATE

The quarrying of slate in New York is restricted at present to a small district in eastern Washington county. The district extends north from Salem through the towns of Hebron, Granville, Hampton and Whitehall and is practically continuous with the Vermont slate district which has much greater economic importance. The slate occurs at several horizons among the metamorphosed Paleozoic strata of the region, but belongs mostly to the Cambric and Ordovicic systems. The associated rocks include limestone, shale, sandstone and quartzite. Extensive slate beds are found also in the southern continuation of the metamorphic region along the east side of the Hudson river, in Rensselaer, Columbia and Dutchess counties. Attempts to work the slate in this section, however, have not been permanently successful, though it is recorded that quarries were operated for a time at Hoosick, New Lebanon and Hamburg.

The slate from Washington county is remarkable for its variety of colors. Red slate is the characteristic product, and has the greatest value owing to its rarity elsewhere. It is quarried chiefly near Granville and in the Hatch Hill and North Granville sections. Purple, mottled and different shades of green slate including the unfading green are also quarried. Nearly all of the product is sold for roofing purposes, as the manufacture of other materials has not been developed to any extent in this State.

A paper by Henry Leighton, descriptive of the general occurrence of slate in Washington county, and of the practice of quarrying and preparing the material for the market is included in the issue of this report for the year 1909.

The production of slate increases and decreases irregularly from year to year, though no very great change has taken place in the industry for some time. During the past year the demand for roofing material was rather poor owing to the dull conditions in the building trades. The total value of the output as reported by the quarry companies amounted to $83,090 as compared with $127,050 in 1909 and $111,217 in 1908. This shows a falling off in the value of nearly 35 per cent. The product of roofing slate amounted to 14,107 squares with a value of $79,857, an average value per square of $5.66. In 1909 the roofing slate amounted to 21,187 squares valued at $126,170, an average of $6.99 a square. These averages are above those obtained for the slate in other districts, due to the fact that the red slate commands a very high price, usually from $8

to $10 a square. The balance of the slate output last year consisted of mill stock with a total value of $3,233, against a value of $880 in 1909.

STONE

Quarry materials are among the leading items in the mineral production of the State. In the aggregate their value ranks second only to that of clay manufactures and the quarry industry is even more widely represented throughout the various sections. They include all the principal varieties of stone used for building purposes, some of which are worked on a fairly extensive scale. The production of building stone, however, has never approximated the requirements of the local markets, and very large quantities of that material are brought in from other states. The main developments in quarrying, hitherto, have taken place in the branches that supply stone for engineering work, road improvements and such purposes which entail a minimum amount of labor for extraction and preparation.

The production of stone in 1910 was valued at $6,193,252 as compared with $7,061,580 in the preceding year. A decrease of $868,338, or about 12 per cent, thus occurred in the industry and was distributed among all the different branches. It should be noted that these figures do not include slate, millstones or limestone used for cement manufacture, which are reported separately.

The output of granite fell to nearly one-half the amount reported in 1909. The value of the product was $244,763 as compared with $479,955 in the preceding year. Both the Adirondack quarries and those in southeastern New York reported a reduced business. New developments that may bring about an expansion of the industry in the near future have been under way in the Adirondack region.

Limestone showed a relatively small decrease; the output was valued at $3,245,807 against $3,300,383 in the preceding year. The wide use of limestone for road work was largely responsible for maintenance of the output.

The value of the marble that was quarried last year amounted to $341,880 against $380,016 in 1909. The Gouverneur and Columbia county quarries both shared in the decline.

Sandstone accounted for a value of $1,451,796 in the total as compared with $1,839,798 for the preceding year. A slight gain in the sandstone for building uses was more than counterbalanced by the falling off in the other kinds like curb and flagstone.

The Hudson river trap quarries were worked on about the usual scale. The value of the product was $909,006 against $1,051,428 in

1909; the quantity of stone quarried was actually larger than in the preceding year, the lower selling price accounting for the decrease in value.

Production of stone in 1908

VARIETY	BUILDING STONE	MONUMENTAL	CURBING AND FLAGGING	CRUSHED STONE	ALL OTHER	TOTAL VALUE
Granite	$71 122	$27 585	*a*	$152 783	$116 074	$367 564
Limestone	245 655	.....	$15 668	1 647 629	1 210 883	3 119 835
Marble	567 444	111 492	.....	.....	13 921	692 857
Sandstone	380 182	.....	912 843	135 741	282 819	1 711 585
Trap	.....	.....	.....	722 863	910	723 773
Total	$1 264 403	$139 077	$928 511	$2 659 016	$1 624 607	$6 615 614

a Included under "All other."

Production of stone in 1909

VARIETY	BUILDING STONE	MONUMENTAL	CURBING AND FLAGGING	CRUSHED STONE	ALL OTHER	TOTAL VALUE
Granite	$35 019	$33 818	$1 352	$182 029	$227 737	$479 955
Limestone	217 109	.....	15 363	1 744 314	1 323 597	3 300 383
Marble	262 934	104 495	25	6 403	6 159	380 016
Sandstone	358 589	.....	783 880	220 200	477 129	1 839 798
Trap	.....	.....	.....	1 061 428	.....	1 061 428
Total	$873 651	$138 313	$800 620	$3 214 374	$2 034 622	$7 061 580

Production of stone in 1910

VARIETY	BUILDING STONE	MONUMENTAL	CURBING AND FLAGGING	CRUSHED STONE	ALL OTHER	TOTAL VALUE
Granite	$40 911	$12 989	*a*	$91 988	$98 875	$244 763
Limestone	99 049	.....	$3 888	1 815 809	1 327 061	3 245 807
Marble	252 965	88 684	.....	.....	231	341 880
Sandstone	387 408	.....	408 132	225 408	358 848	1 451 796
Trap	.....	.....	.....	908 931	75	909 006
Total	$780 333	$101 673	$484 020	$3 042 136	$1 785 090	$6 193 252

a Included under "All other."

GRANITE

In the strict sense granite is an entirely crystalline igneous rock made up of potash, feldspar and quartz, usually with subordinate amounts of mica, hornblende or pyroxene. Among quarrymen and builders, however, the name granite is given to various other types of rocks, such as the heavier and darker colored diorites, norites, gabbros, syenite which resembles granite but lacks quartz, and the bedded or banded rocks known as gneisses and schists.

Two main areas of extensive outcrops of granites and gneissic rocks are found in the State: the Adirondacks and bordering region and the Highlands of southeastern New York. In both areas a wide variety of these rocks exists from which material suitable for almost any purpose can be obtained. Up to the present time, however, the local granites have not been utilized to any great extent for cut and polished work, of which trade the New England quarries have long held control.

In the Adirondack region the prevailing rock formations are granite, syenite, anorthosite and norite of both massive and gneissoid types. Quarries have been opened only in the more accessible places on the borders.

One of the best known products from this region is the red granite which is obtained on Picton and Wellesley islands in the St Lawrence river. This is a true granite, of attractive red and pink shades, ranging from fine to course texture, and takes a handsome polish. It ought to command a wide market for monumental and building purposes.

Green syenite is quarried at West Chazy and Ausable Forks. The Adirondack Granite Co. has recently undertaken the development of large quarries at the latter locality and intends to erect a dressing and polishing plant for turning out all classes of work. The company has secured the quarries formerly worked by the Ausable Forks Granite Co., as well as additional properties. The products of the quarries are green and dark green granite (syenite) and light gray granite (anorthosite). The syenite is particularly adapted for polished material. The anorthosite has the qualities of an attractive building stone.

An outlying mass of Adirondack crystalline rocks occurs at Little Falls, Herkimer county, where quarries have been opened principally for supplying crushed stone. The crushing plant of the Syenite-Trap Rock Co., which was destroyed by fire in 1909, is in course of reconstruction.

The granite quarries of southeastern New York are mainly situated in Westchester county. The Fordham gneiss, a well-foliated, grayish biotite gneiss, supplies stone for foundations and rough masonry. The Yonkers gneiss, more massive than the former and containing hornblende, affords a good building material. Dikes and bosses of massive granite are also common in this region and have been quarried quite extensively for building purposes at New Rochelle, Mount Vernon and Lake Mohegan, Westchester county;

Round Island, Rockland county; and Pine Island, Orange county. The Storm King granite, below Cornwall, is used for crushed stone.

The granite trade last year showed a marked recession, the production falling below that of any recent year excepting 1907. The decrease was mainly in the crushed stone and paving block industries, though the output of granite for building and monumental work did not attain the usual proportions. The total production was valued at $244,763 against $479,955 in 1909 and $367,564 in 1908. Building stone, rough and dressed, contributed $40,911 to the total as compared with $35,019 in the preceding year and $71,122 in 1908. The output of crushed stone amounted in value to $91,988 against $182,029; monumental stone to $12,989 against $33,818; rubble and riprap to $20,272 against $12,737; and paving blocks and other kinds to $78,603 against $216,352 in 1909.

Production of granite

	1908	1909	1910
Building stone	$71 122	$35 019	$40 911
Monumental	27 585	33 818	12 989
Crushed stone	152 783	182 029	91 988
Rubble, riprap	15 351	12 737	20 272
Other kinds[a]	100 723	216 352	78 603
Total	$367 564	$479 955	$244 763

a Includes curbing, paving blocks and minor uses.

LIMESTONE

The stone classified under this heading consists for the most part of the common grades of limestone and dolomite such as are characterized by a compact granular or finely crystalline texture and are lacking in ornamental qualities.

A smaller part is represented by crystalline limestone and by the waste product of marble quarrying which is sometimes employed for crushed stone, lime making or flux. Limestone used for the manufacture of portland and natural cement is, however, excluded from the tabulations so as to avoid any duplication of the statistics.

Limestones are widely distributed in the State; the only region which is not well supplied with this stone being the southern part where the prevailing formations are sandstones of Devonic age. In the western and central parts the Onondaga and Cobleskill lime-

stones and the Lockport dolomite furnish material for most requirements, though they are as a rule rather impure. In the northern section the Trenton and Chazy limestones and the Precambric crystalline limestone are well represented and in some localities are of very high quality. The Hudson river region has an important quarrying industry which is based on limestones of various ages, ranging from the Precambric crystalline series in the Highands of southeastern New York to the Salina and Helderberg limestones of the eastern counties. Besides the hard limestones as noted, there are unconsolidated calcareous deposits or marls which are found in swamps and old lake beds, particularly in the central and western parts of the State. They are utilized to some extent for cement manufacture and for fertilizer.

The limestone quarries rank first in importance among the stone industries. The product for 1910 was valued at $3,245,807, and was distributed among 32 counties. The returns showed a slight decrease as compared with the output in 1909 which was valued at $3,300,383.

Erie county has the largest product of any county, with a value of $866,335 for last year. Onondaga county ranks second, its importance being chiefly due to the operations of the Solvay Process Co., a large consumer of limestone in alkali manufacture. Then follow in order Dutchess, Jefferson, Genesee, Warren, and Albany counties, each reporting a product of more than $100,000.

The distribution of the limestone by counties and also according to uses is shown in the accompanying tables.

Production of limestone

MATERIAL	1908	1909	1910
Crushed stone	$1 647 629	$1 744 314	$1 815 809
Lime made	401 728	452 874	365 839
Building stone	245 655	217 109	99 049
Furnace flux	230 117	434 311	538 491
Rubble, riprap	[a]	82 748	30 819
Flagging, curbing	15 668	15 363	3 888
Miscellaneous	[b] 579 038	[b] 353 664	[b] 391 912
Total	$3 119 835	$3 300 383	$3 245 807

[a] Included in "Miscellaneous."
[b] Includes lime made by Solvay Process Co. and Union Carbide Co., also rubble and riprap.

Crushed stone. Limestone finds its principal application as crushed stone in which form it is extensively employed for road metal, concrete, and railroad ballast. There are large quarries in Erie, Genesee, Dutchess and Rockland counties, besides a great number of smaller ones elsewhere that are equipped with crushing plants. The recent canal and highway improvements have furnished a large market for the material and the production has shown a steady increase. The fine product that results from crushing is finding use as a fertilizer for soils deficient in lime.

The value of the crushed limestone for 1910 was reported as $1,815,809 as compared with $1,744,314 for the preceding year. The amount of the product was about 2,800,000 cubic yards. Erie county led with a production valued at $476,490 against $447,605 in 1909. The other counties reporting values over $100,000 were Dutchess, Rockland, Onondaga, Albany, and Genesee.

Lime. The total value of lime made in 1910 was $365,839. This branch of the industry experienced a poor season owing to the dull conditions in the building trades. In the preceding year the value was reported as $452,874. The lime made by the Solvay Process Co. and the Union Carbide Co. has not been included in the totals, but classed under " Other uses." The leading counties in the manufacture of lime for the trade were Warren with a total value of $140,576; Jefferson with $55,837; and Clinton with $48,823.

Building stone. The limestones found in the State have only a limited sale for building purposes, and few quarries supply more than a local demand, so that their output fluctuates greatly from year to year. The restricted market is probably due largely to the fact that the limestones are prevailingly of dark or somber colors, whereas the present demand is for the lighter colors like those of the Bedford limestone and Ohio sandstone. The extending use of concrete has also been a factor in the recent decline of the cut stone trade, though it has increased the sale of crushed stone.

The returns for 1910 indicated a total product of building stone valued at $99,049 as compared with a value of $217,109 for the preceding year and $245,655 for 1908. The loss was distributed among various counties, but it was most apparent in Erie where the output showed a falling off from a value of $119,134 in 1909 to $53,881 last year. The quarries in Schoharie and Herkimer counties which have been notable producers in earlier years were either inactive or were operated on a small scale.

Furnace flux. The value of the limestone used in blast furnaces for flux is second only to that of crushed stone. The principal quarries of this material are in the Onondaga limestone of Erie and Genesee counties, from which the Buffalo iron furnaces derive much of their supply. The Lockport dolomite is also quarried in Niagara county and shipped to furnaces in that section. The furnaces of northern New York derive their supply of flux from the Chazy limestone of Clinton county and the crystalline limestone in Essex county. One quarry in the Gouverneur marble district ships its product to furnaces in western New York.

The production of flux in 1910 reached a value of $538,491 which was the largest ever recorded. The output for the preceding year was valued at $434,311, so that the gain was nearly 25 per cent. Erie county contributed a value of $322,067, or about 60 per cent of the total. Genesee county made an output valued at $90,132.

Production of limestone by counties in 1909

COUNTY	CRUSHED STONE	LIME MADE	FURNACE FLUX	BUILDING STONE	OTHER USES	TOTAL
Albany	$105 440	$4 600	.....	$200	.....	$110 240
Cayuga	36 734	400	$610	6 835	$2 500	47 079
Clinton	21 735	47 488	14 200	13 325	532	97 280
Columbia	9 883	.....	3 460	200	.....	13 543
Dutchess	365 661	4 000	.....	.....	.....	369 661
Erie	447 605	375	257 966	119 134	28 684	853 764
Fulton	.....	18 900	.....	.....	.....	18 900
Genesee	123 784	5 400	99 814	1 225	.....	230 223
Greene	4 177	.....	.....	500	30	4 707
Herkimer	6 611	3 350	.....	.....	.....	9 961
Jefferson	1 000	[a] 57 368	.....	562	153 420	212 350
Lewis	940	8 000	.....	887	2 359	12 186
Madison	24 176	.....	.....	840	12 000	37 016
Monroe	20 218	23 593	.....	3 917	2 454	50 182
Montgomery	42 832	.....	.....	10 440	1 503	54 775
Niagara	2 060	3 000	27 920	5 587	612	39 179
Onondaga	110 886	[a] 600	.....	17 380	231 842	360 708
Rensselaer	15 700	.....	75	3 550	6 750	26 075
St Lawrence	6 630	5 350	23 994	2 993	1 103	40 070
Saratoga	11 316	.....	.....	100	.....	11 416
Schoharie	18 913	400	.....	25 885	.....	45 198
Seneca	1 050	360	40	865	210	2 525
Ulster	48 022	11 360	.....	1 200	.....	60 582
Warren	22 938	175 830	.....	1 156	1 750	201 674
Washington	47 660	43 200	.....	.....	2 000	92 860
Westchester	8 252	30 000	.....	.....	3 465	41 717
Other counties [b]	240 091	9 300	6 232	328	561	256 512
Total	$1 744 314	$452 874	$434 311	$217 109	$451 775	$3 300 383

[a] Lime used by Solvay Process Co. and Union Carbide Co. included in "Other uses."
[b] Includes Essex, Ontario, Oneida, Orange, Rockland and Schenectady counties.

Production of limestone by counties in 1910

COUNTY	CRUSHED STONE	LIME MADE	FURNACE FLUX	BUILDING STONE	OTHER USES	TOTAL
Albany	$125 450	$4 500	.....	.....	.....	$129 950
Cayuga	39 019	.....	.....	$7 690	.....	46 709
Clinton	13 549	48 823	$12 364	4 160	.....	78 896
Erie	476 490	152	322 067	53 881	$13 745	866 335
Genesee	118 797	5 000	90 132	480	200	214 609
Greene	8 225	.....	.....	.....	.....	8 225
Herkimer	8 520	3 114	.....	.....	.....	10 434
Jefferson	1 693	[a]55 837	.....	200	168 265	225 995
Lewis	1 195	3 200	.....	520	726	5 641
Madison	52 028	.....	2 625	800	.....	55 453
Monroe	17 423	29 520	.....	2 589	1 719	51 251
Montgomery	29 810	.....	.....	8 622	2 125	40 557
Niagara	5 000	4 000	76 695	3 197	406	89 298
Onondaga	150 640	[a]1 620	.....	12 092	233 228	397 580
Rensselaer	15 000	.....	.....	100	70	15 170
St Lawrence	870	7 240	27 008	362	1 116	36 596
Saratoga	15 114	.....	.....	7	.....	15 121
Schoharie	12 441	128	.....	1 567	624	14 760
Seneca	1 625	192	192	1 192	75	3 276
Ulster	20 654	11 897	.....	.....	.....	32 551
Warren	31 378	140 576	.....	1 583	.....	173 537
Washington	50 000	44 200	.....	.....	.....	94 200
Westchester	59 387	.....	.....	.....	3 802	63 189
Other counties[b]	561 501	5 840	7 408	7	518	575 274
Total	$1 815 809	$365 839	$538 491	$99 049	$426 619	$3 245 807

[a] Lime made by Solvay Process Co. and Union Carbide Co. included in "Other uses."
[b] Includes Columbia, Dutchess, Essex, Fulton, Oneida, Ontario, Orange and Rockland counties.

MARBLE

The granular crystalline limestones and dolomites classed as marble are found in the metamorphosed areas of the Adirondacks and southeastern New York. A few varieties of compact, noncrystalline limestone, such as the black limestone of the Trenton formation occurring at Glens Falls and the fossiliferous Chazy limestone along Lake Champlain, possess ornamental qualities that fit them for special uses and pass as marble in the trade.

The principal quarries of monumental marble are situated in the vicinity of Gouverneur, St Lawrence county. The typical product is a rather coarse-grained, mottled white and gray marble which takes a lustrous polish. It is graded according to color effect into "light," "medium," "dark," and "extra dark." The best quality is employed for monumental and ornamental work; building stone is of secondary importance. The quarries are operated by the Gouverneur Marble Co., St Lawrence Marble Quarries, and J. J. Callahan & Sons.

The belt of metamorphosed limestones which extends from Columbia county through Dutchess and Westchester to Manhattan island contains in places a good grade of white and gray marble. Quarries have been worked in the past at Ossining, Dobbs Ferry, White Plains, Pleasantville, Tuckahoe, Greenport and other places. Tuckahoe has been a notable locality for white marble used in the buildings of New York city. At present the only active quarries worked for building stone are at South Dover. The South Dover Marble Co. has been the chief producer of late years and has supplied material for many of the large structures in New York, Washington and other cities. The Dover White Marble Co. has recently opened quarries in the same vicinity. The stone from this locality possesses uniformity of grain and color and is undoubtedly one of the best white marbles in this country.

A mottled pink and gray marble suitable for interior decorations is obtained from the Chazy formation at Plattsburg. The quarries are operated by the Rutland-Florence Marble Co.

Black marble — a fine, compact, black variety of the Trenton limestone — is quarried for ornamental purposes at Glens Falls by Finch, Pruyn & Co. who ship the stone in rough blocks.

The production of marble in the State last year was valued at $341,880. The output was a little below that recorded for 1909 which amounted to $380,016, and much less than the total for 1908 which reached $692,857. The slackened demand for building stone seems to have been mainly responsible for the decline of output, though the monumental trade at Gouverneur has also been less active than formerly.

Production of marble

VARIETY	1908	1909	1910
Building marble	$567 444	$262 934	$252 965
Monumental	111 492	104 495	88 684
Other kinds	13 921	12 587	231
Total	$692 857	$380 016	$341 880

SANDSTONE

Under sandstone are included the sedimentary rocks which consist essentially of quartz grains held together by some cementing substance. Among the varieties distinguished by textural features are sandstones proper, conglomerates, grits and quartzites.

Of the sedimentary rocks which occur in the State sandstone has the largest areal distribution, while in economic importance it ranks second only to limestone. Nearly all of the recognized formations above the Archean contain sandstones at one or more horizons. The kinds chiefly quarried are the Potsdam, Hudson River, Medina and the Devonic sandstones. A few quarries have been opened also in the Shawangunk conglomerates and the Clinton and Triassic sandstones.

In western New York the principal quarries are situated within the belt of Medina sandstone which outcrops just south of Lake Ontario from Oswego to Niagara county. This is a medium-grained pink or red stone of attractive appearance and good wearing qualities. It is extensively employed for building stone, as well as for paving blocks, curbing and such purposes. The largest quarry industry is in Orleans county in the vicinity of Albion, Holley and Medina, but there are also quarries at Lockport and Lewiston in Niagara county and at Brockport and Rochester, Monroe county. The product of the Niagara county quarries has a white color differing in this respect from the usual grade which is obtained from the reddish layers higher up in the series.

Along the northern and southwestern borders of the Adirondacks is the Potsdam sandstone which has been extensively worked for structural material and flagstone. It is red or gray and ranges from hard flinty quartzite to a somewhat loosely cemented sandstone. The principal quarry openings are near Potsdam and Redwood, St Lawrence county, and Malone and Burke, Franklin county. The Potsdam is also exposed in places along the Champlain valley and has been worked to some extent at Port Henry, Whitehall and Fort Ann. The quarries at Burke produce flagstone chiefly for shipment to Montreal and other Canadian cities.

The Hudson River sandstones are mainly quarried along the Hudson and Mohawk rivers for local requirements in building and engineering work. There are quarries in Albany, Rensselaer, Greene, Dutchess, and Herkimer counties, but few have been operative in recent years.

The Devonic sandstones which extend over much of the area in southern New York are commonly grouped under the class of bluestone, a name first applied to them in Ulster county where they are distinguished by a bluish gray color. They are typically fine-grained, evenly bedded, bluish or gray sandstones, often showing a

pronounced tendency to split along planes parallel to the bedding so as to yield smooth thin slabs. For that reason they are extensively used for flagging and curbing and a large industry is based on the quarrying of these materials for sale in the eastern cities. Most flagstone is produced in the region along the Hudson and Delaware rivers where there are convenient shipping facilities to New York, Philadelphia and other large cities. The Hudson River district includes Albany, Greene, and Ulster counties, with Catskill, Saugerties, and Kingston as the chief shipping points. In the Delaware River district are Sullivan, Delaware, and Broome counties with a great number of shipping stations along the Erie and Ontario & Western railroads. The Devonic sandstones are also quarried in many of the counties to the west of these districts, but principally around Norwich, Chenango county, and Warsaw, Wyoming county, which produce large quantities of building stone.

The total production of sandstone in 1910 was valued at $1,451,796. Compared with the value for the preceding year which amounted to $1,839,798, this showed a decrease of $388,002 or a little over 20 per cent. In 1908 the value of the output was $1,711,585.

The large decrease reported for the past year may be ascribed to the lessened activity in the Hudson River and Delaware River districts which shipped a much smaller quantity of curbing and flagging than usual. The value of the bluestone quarried was $1,037,637 against $1,301,959 in 1909. Of the total, curbing and flagging constituted $385,825 as compared with $608,116 in the preceding year, a decline of about 35 per cent. The value of the bluestone used for building purposes, on the other hand, showed a slight advance from $298,631 in 1909 to $351,603 last year.

Sandstone, other than bluestone, constituted a value of $414,159 against $537,839 in the preceding year. The decrease was distributed practically among all the quarry districts. The Orleans county quarries reported an output valued at $332,382 as compared with $385,281 in 1909.

Production of sandstone in 1909

DISTRICT	BUILDING STONE	CURBING AND FLAGGING	PAVING BLOCKS	CRUSHED STONE	RUBBLE, RIPRAP	ALL OTHER
Bluestone						
Hudson river	$7 552	$256 193	.....	$175 000	.....	$116 268
Delaware river	23 165	324 906	.....	.....	$3 905	88 839
Chenango co	66 141	21 340	.....	.....	368	1 059
Wyoming co	191 276	480	.....	.....	443	850
Other districts	10 497	5 197	.....	7 662	.....	818
Total bluestone	$298 631	$608 116	.....	$182 662	$4 716	$207 834
Sandstone						
Orleans co	$16 017	$116 816	$246 091	$874	$4 283	$1 200
Other districts	43 941	58 948	2 660	36 664	8 245	2 100
Total sandstone	$59 958	$175 764	$248 751	$37 538	$12 528	$3 300
Combined total	$358 589	$783 880	$248 751	$220 200	$17 244	$211 134

Production of sandstone in 1910

DISTRICT	BUILDING STONE	CURBING AND FLAGGING	PAVING BLOCKS	CRUSHED STONE	RUBBLE, RIPRAP	ALL OTHER
Bluestone						
Hudson river	$26 689	$164 593	.....	$200 000	$42 000	$500
Delaware river	33 965	212 463	.....	.....	55 010	170
Chenango co	74 985	7 879	.....	.....	1 165	.....
Wyoming co	208 444	.....	.....	.....	327	237
Other districts	7 520	890	.....	790	.....	10
Total bluestone	$351 603	$385 825	.....	$200 790	$98 502	$917
Sandstone						
Orleans co	$23 403	$83 539	$202 773	$4 003	$14 869	$3 755
Other districts	12 402	10 768	26 080	20 615	6 125	5 827
Total sandstone	$35 805	$94 307	$228 853	$24 618	$20 994	$9 582
Combined total	$387 408	$480 132	$228 853	$225 408	$119 496	$10 499

TRAP

The quarrying of trap is a somewhat specialized branch of the stone industry which may be treated with advantage under a separate head. Trap is not a distinct rock type, but the name properly belongs to the fine-grained, dark colored igneous rocks that occur as intrusive sheets or dikes. In mineral composition it differs from the other igneous rocks classed in the trade as granite, by the prevalence of lime-soda feldspars and higher percentages of the lime, magnesia and iron minerals and correspondingly lower amounts of silica, with little or no free quartz. The name is sometimes applied to fine-grained igneous rocks of granitic or syenitic composition and even to rocks of sedimentary derivation, but such usage is misleading and indefensible.

The particular value of trap is due mainly to its hardness and toughness. Its fine, compact homogeneous texture gives it great wearing powers and it is eminently adapted for road metal and for concrete of which heavy service is required. It has been used to some extent in this State as Belgian blocks. As a building stone it finds very little application, probably on account of its somber color. The expense of cutting and dressing trap is also an obstacle to its employment for building or ornamental purposes.

The trap quarried in New York is properly a diabase, made up of plagioclase feldspar in lath-shaped crystals and pyroxene as the main constituents, and amphibole, olivine and magnetite as subordinate minerals. The largest occurrence is represented by the Palisades of the Hudson, which begin near Haverstraw and extend southward into New Jersey. The Palisades represent the exposed edge of a sill or sheet of diabase intruded between shales and sandstones of Triassic age. The sheet is from 300 to 800 feet thick and about 70 miles long. Most of the trap quarried in this State has been obtained from this region, chiefly from the vicinity of Haverstraw and Nyack, but to some extent from near Richmond, Staten island, where the sheet has its southern termination. Smaller occurrences of diabase are found in the Adirondacks and the bordering area. There are countless numbers of trap dikes in the interior of the Adirondacks, but few have any considerable thickness and in general they are too remote from the market to be profitably quarried. In the outlying region the dikes at Greenfield, Saratoga county, and at Little Falls, Herkimer county, are the most notable. Quarries have been opened at the former locality and the trap is crushed for road metal.

The production of trap in 1910 amounted to 1,185,780 cubic yards valued at $909,006, an increase of quantity but a decrease in value as compared with the totals reported in the previous year. Of the production a little less than 90 per cent was sold for road metal and the remainder for concrete work and ballast. Eight firms were represented in the industry, seven of which operated quarries in Rockland county, and one the quarry at Greenfield, Saratoga county. The Ramapo Trap Rock Co. of Suffern, Rockland county, was a new producer.

During the past year plans were formulated for the establishment of a State park which will include the Palisades from the New Jersey state line north into Rockland county. By a legislative enactment it is proposed to acquire by purchase or condemnation the lands lying between the base and top of the Palisades and also such unimproved lands on the top from the New Jersey state line to Piermont creek in Rockland county, as are necessary to preserve the scenic features from further injury. The execution of this plan was placed in charge of the commissioners of the Palisades Interstate Park. The quarries of the Manhattan Trap Rock Co. have already been acquired and it is reported that the others will be taken over in the near future. In that event the trap industry which for many years has supplied a large part of the crushed stone to the lower Hudson region will be reduced to small proportions if not definitely ended.

Production of trap

MATERIAL	1909		1910	
	CUBIC YARDS	VALUE	CUBIC YARDS	VALUE
Crushed stone for roads.	868 650	$823 696	1 000 187	$786 733
Crushed stone for other purposes	226 681	237 732	185 493	122 198
Other kinds	.....	.....	100	75
Total	1 095 331	$1 061 428	1 185 780	$909 006

TALC

The talc mines in the Gouverneur district last year continued to supply a large output for the demands of the paper trade and for other purposes. The list of producers remained unchanged, with the Ontario Talc Co. and the International Pulp Co. as the only active representatives. The latter company carried on the largest operations and for some time has been the leading factor in the production and sale of ground talc in this country; its position was materially strengthened a few years ago by securing control of the mines and mills formerly owned by the Union Talc Co. and the United States Talc Co.

The general features of the Gouverneur talc district and of the mining developments were described in the issue of this report for 1908.

An important recent development is connected with the preparations of the Uniform Fibrous Talc Co. for engaging in the industry. This company was formed in 1908 since which time it has opened a mine just west of Talcville and erected a mill in the same locality. The mill, a steel frame structure on concrete foundations, was designed for about 50 tons daily capacity. Power for both mines and mill will be supplied by an independent hydroelectric plant on the Oswegatchie river, above Dodgeville. Productive operations were begun in January of this year.

The Ontario Talc Co. has concentrated its mining operations on the Potter property, below Fullerville, which the company began to develop a few years ago. The workings are now down about 175 feet on the bed which dips 45° and ranges from twelve to eighteen feet in thickness. There is little water in the mine, and the walls are sufficiently strong to require no timbering, though not infrequently they give trouble in the mines of this district. The product is hauled in wagons about a mile to the grinding plant where it is prepared in the usual manner by reduction in crushers and pebble mills. The ground talc is mainly of one grade, of finely fibrous texture, and finds sale among paper, wall plaster and paint manufacturers.

The International Pulp Co. has obtained most of its supply of rock from the mines in the northeastern section of the belt. The mine once owned by the United States Talc Co. has been one of its chief producers since the consolidation. The Arnold and Balmat mines of the old Union Talc Co. have been worked intermittently

according to needs. The company is opening a new mine in the vicinity of the old Wight mine.

The finished talc from this district is shipped in bags of 50 and 200 pound sizes. Gouverneur, the shipping point on the main railroad lines, is about ten miles from the center of the district which is served by a branch railroad that runs between Gouverneur and Edwards. The mills of the International Pulp Co. are connected by spurs with this railroad and the talc loaded directly on cars.

The first important production of talc outside of the Gouverneur district was made last year by the St Lawrence Talc and Asbestos Co., which operated a deposit near Natural Bridge, Lewis county. As mentioned in the review of the talc industry for 1909, the occurrence at that place may be comparable to the deposits in St Lawrence county so far as geological relations are concerned, though the talc itself has a somewhat different appearance and structure. The product obtained last year was shipped in lump form for manufacture elsewhere into various materials such as powder, disks and pencils. Productive operations were suspended in November in order to make necessary improvements preliminary to the construction of a crushing plant and mill. An electric power station has already been erected. The mill as designed will probably turn out 60 tons of ground talc a day.

Production of talc in New York

YEAR	SHORT TONS	VALUE	VALUE PER TON
1896	46 089	$399 443	$8 67
1897	57 009	396 936	6 96
1898	54 356	411 430	7 57
1899	54 655	438 150	8 02
1900	63 500	499 500	7 87
1901	62 200	483 600	6 99
1902	71 100	615 350	8 65
1903	60 230	421 600	7 ..
1904	65 000	455 000	7 ..
1905	67 000	519 250	7 75
1906	64 200	541 600	8 43
1907	59 000	501 500	8 50
1908	70 739	697 390	9 86
1909	50 000	450 000	9 ..
1910	65 000	552 500	8 50

The production of talc in New York for the period 1896-1910 is shown in the accompanying table. The figures for the years previous to 1904 are from the volumes of the *Mineral Resources.*

The average output of the Gouverneur district has been about 65,000 tons a year, with variations of 5000 tons or a little more from year to year. During some of the last few years the production has been below normal, owing to the slight rainfall in the summer months and consequent want of power for grinding the talc. The quantity turned out last year may be placed at about 65,000 short tons as compared with 50,000 tons in 1909. The value of the production was $552,500 against $450,000 in 1909.

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New York State Education Department

New York State Museum

JOHN M. CLARKE, Director

PUBLICATIONS

Packages will be sent prepaid except when distance or weight renders the same impracticable. On 10 or more copies of any one publication 20% discount will be given. Editions printed are only large enough to meet special claims and probable sales. When the sale copies are exhausted, the price for the few reserve copies is advanced to that charged by second-hand booksellers, in order to limit their distribution to cases of special need. Such prices are inclosed in [ ]. All publications are in paper covers, unless binding is specified. Checks or money orders should be addressed and payable to New York State Education Department.

Museum annual reports 1847–date. *All in print to* 1894, 50c *a volume*, 75c *in cloth; 1894–date, sold in sets only;* 75c *each for octavo volumes; price of quarto volumes on application.*

These reports are made up of the reports of the Director, Geologist, Paleontologists Botanist and Entomologist, and museum bulletins and memoirs, issued as advance section of the reports.

Director's annual reports 1904–date.

1904. 138p. 20c.
1905. 102p. 23pl. 30c.
1906. 186p. 41pl. 35c.
1907. 212p. 63pl. 50c.
1908. 234p. 39pl. map. 40c.
1909. 230p. 41pl. 2 maps, 4 charts. *Out of print.*
1910. 280p. il. 42pl. 50c.

These reports cover the reports of the State Geologist and of the State Paleontologist. Bound also with the museum reports of which they form a part.

Geologist's annual reports 1881–date. Rep'ts 1, 3–13, 17–date, 8vo; 2, 14–16, 4to.

In 1898 the paleontologic work of the State was made distinct from the geologic and was reported separately from 1899–1903. The two departments were reunited in 1904, and are now reported in the Director's report.

The annual reports of the original Natural History Survey, 1837–41, are out of print.

Reports 1–4, 1881–84, were published only in separate form. Of the 5th report 4 pages were reprinted in the 39th museum report, and a supplement to the 6th report was included in the 40th museum report. The 7th and subsequent reports are included in the 41st and following museum reports, except that certain lithographic plates in the 11th report (1891) and 13th (1893) are omitted from the 45th and 47th museum reports.

Separate volumes of the following only are available.

Report	*Price*	*Report*	*Price*	*Report*	*Price*
12 (1892)	$.50	17	$.75	21	$.40
14	.75	18	.75	22	.40
15, 2v.	2	19	.40	23	.45
16	1	20	.50	[*See* Director's annual reports]	

Paleontologist's annual reports 1899–date.

See first note under Geologist's annual reports.

Bound also with museum reports of which they form a part. Reports for 1899 and 1900 may be had for 20c each. Those for 1901–3 were issued as bulletins. In 1904 combined with the Director's report.

Entomologist's annual reports on the injurious and other insects of the State of New York 1882–date.

Reports 3–20 bound also with museum reports 40–46, 48–58 of which they form a part. Since 1898 these reports have been issued as bulletins. Reports 3–4, 17 are out of print, other reports with prices are:

Report	Price	Report	Price	Report	Price
1	$.50	11	$.25	19 (Bul. 76)	$.15
2	.30	12	.25	20 (" 97)	.40
5	.25	13	*Free*	21 (" 104)	.25
6	.15	14 (Bul. 23)	.20	22 (" 110)	.25
7	.20	15 (" 31)	.15	23 (" 124)	.75
8	.25	16 (" 36)	.25	24 (" 134)	.35
9	.25	18 (" 64)	.20	25 (" 141)	.35
10	.35			26 (" 147)	.35

Reports 2, 8–12 may also be obtained bound in cloth at 25c each in addition to the price given above.

Botanist's annual reports 1867–date.

Bound also with museum reports 21–date of which they form a part; the first Botanist's report appeared in the 21st museum report and is numbered 21. Reports 21–24, 29, 31–41 were not published separately.

Separate reports for 1871–74, 1876, 1888–98 are out of print. Report for 1899 may be had for 20c; 1900 for 50c. Since 1901 these reports have been issued as bulletins.

Descriptions and illustrations of edible, poisonous and unwholesome fungi of New York have also been published in volumes 1 and 3 of the 48th (1894) museum report and in volume 1 of the 49th (1895), 51st (1897), 52d (1898), 54th (1900), 55th (1901), in volume 4 of the 56th (1902), in volume 2 of the 57th (1903), in volume 4 of the 58th (1904), in volume 2 of the 59th (1905), in volume 1 of the 60th (1906), in volume 2 of the 61st (1907), 62d (1908), 63d (1909) reports. The descriptions and illustrations of edible and unwholesome species contained in the 49th, 51st and 52d reports have been revised and rearranged, and, combined with others more recently prepared, constitute Museum Memoir 4.

Museum bulletins 1887–date. 8vo. *To advance subscribers, $2 a year or $1 a year for division (1) geology, economic geology, paleontology, mineralogy; 50c each for division (2) general zoology, archeology, miscellaneous, (3) botany, (4) entomology.*

Bulletins are grouped in the list on the following pages according to divisions.

The divisions to which bulletins belong are as follows:

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2 Botany	53 Entomology	103 Entomology
3 Economic Geology	54 Botany	104 "
4 Mineralogy	55 Archeology	105 Botany
5 Entomology	56 Geology	106 Geology
6 "	57 Entomology	107 "
7 Economic Geology	58 Mineralogy	108 Archeology
8 Botany	59 Entomology	109 Entomology
9 Zoology	60 Zoology	110 "
10 Economic Geology	61 Economic Geology	111 Geology
11 "	62 Miscellaneous	112 Economic Geology
12 "	63 Paleontology	113 Archeology
13 Entomology	64 Entomology	114 Paleontology
14 Geology	65 Paleontology	115 Geology
15 Economic Geology	66 Miscellaneous	116 Botany
16 Archeology	67 Botany	117 Archeology
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Bulletins are also found with the annual reports of the museum as follows:

Bulletin	*Report*	*Bulletin*	*Report*	*Bulletin*	*Report*	*Bulletin*	*Report*
12–15	48, v. 1	72	57, v. 1, pt 2	102	59, v. 1	134	62, v. 2
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The figures at the beginning of each entry in the following list indicate its number as a museum bulletin.

Geology. **14** Kemp, J. F. Geology of Moriah and Westport Townships, Essex Co. N. Y., with notes on the iron mines. 38p. il. 7pl. 2 maps. Sept. 1895. Free.

19 Merrill, F. J. H. Guide to the Study of the Geological Collections of the New York State Museum. 164p. 119pl. map. Nov. 1898. *Out of print.*

21 Kemp, J. F. Geology of the Lake Placid Region. 24p. 1pl. map. Sept. 1898. Free.

48 Woodworth, J. B. Pleistocene Geology of Nassau County and Borough of Queens. 58p. il. 8pl. map. Dec. 1901. 25c.

56 Merrill, F. J. H. Description of the State Geologic Map of 1901. 42p. 2 maps, tab. Nov. 1902. Free.

77 Cushing, H. P. Geology of the Vicinity of Little Falls, Herkimer Co. 98p. il. 15pl. 2 maps. Jan. 1905. 30c.

83 Woodworth, J. B. Pleistocene Geology of the Mooers Quadrangle. 62p. 25pl. map. June 1905. 25c.

84 —— Ancient Water Levels of the Champlain and Hudson Valleys. 206p. il. 11pl. 18 maps. July 1905. 45c.

95 Cushing, H. P. Geology of the Northern Adirondack Region. 188p. 15pl. 3 maps. Sept. 1905. 30c.

96 Ogilvie, I. H. Geology of the Paradox Lake Quadrangle. 54p. il. 17pl. map. Dec. 1905. 30c.

106 Fairchild, H. L. Glacial Waters in the Erie Basin. 88p. 14pl. 9 maps. Feb. 1907. *Out of print.*

107 Woodworth, J. B.; Hartnagel, C. A.; Whitlock, H. P.; Hudson, G. H.; Clarke, J. M.; White, David & Berkey, C. P. Geological Papers. 388p. 54pl. map. May 1907. 90c, *cloth.*

Contents: Woodworth, J. B. Postglacial Faults of Eastern New York.
Hartnagel, C. A. Stratigraphic Relations of the Oneida Conglomerate.
—— Upper Siluric and Lower Devonic Formations of the Skunnemunk Mountain Region.
Whitlock, H. P. Minerals from Lyon Mountain, Clinton Co.
Hudson, G. H. On Some Pelmatozoa from the Chazy Limestone of New York.
Clarke, J. M. Some New Devonic Fossils.
—— An Interesting Style of Sand-filled Vein.
—— Eurypterus Shales of the Shawangunk Mountains in Eastern New York.
White, David. A Remarkable Fossil Tree Trunk from the Middle Devonic of New York.
Berkey, C. P. Structural and Stratigraphic Features of the Basal Gneisses of the Highlands.

111 Fairchild, H. L. Drumlins of New York. 60p. 28pl. 19 maps. July 1907. *Out of print.*

115 Cushing, H. P. Geology of the Long Lake Quadrangle. 88p. 20pl. map. Sept. 1907. *Out of print.*

126 Miller, W. J. Geology of the Remsen Quadrangle. 54p. il. 11pl. map. Jan. 1909. 25c.
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Union Springs, Cayuga county and vicinity. Mus. Bul. 69. 1903.
*Olean quadrangle. Mus. Bul. 69. 1903. Free.
*Becraft Mt with 2 sheets of sections. (Scale 1 in. = ½ m.) Mus. Bul. 69. 1903. 20c.
*Canandaigua-Naples quadrangles. Mus. Bul. 63. 1904. 20c.
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